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Editorial and Advertising Offices
100 East 42nd St., New York 17, N.Y., U.S.A.

O. L. Johnson, Market Research Mgr.
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Regional Business Managers

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# This Week in The IRON AGE

Vol. 154, No. 4 — July 27, 1944

## Editorial



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## Features



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## News and Markets



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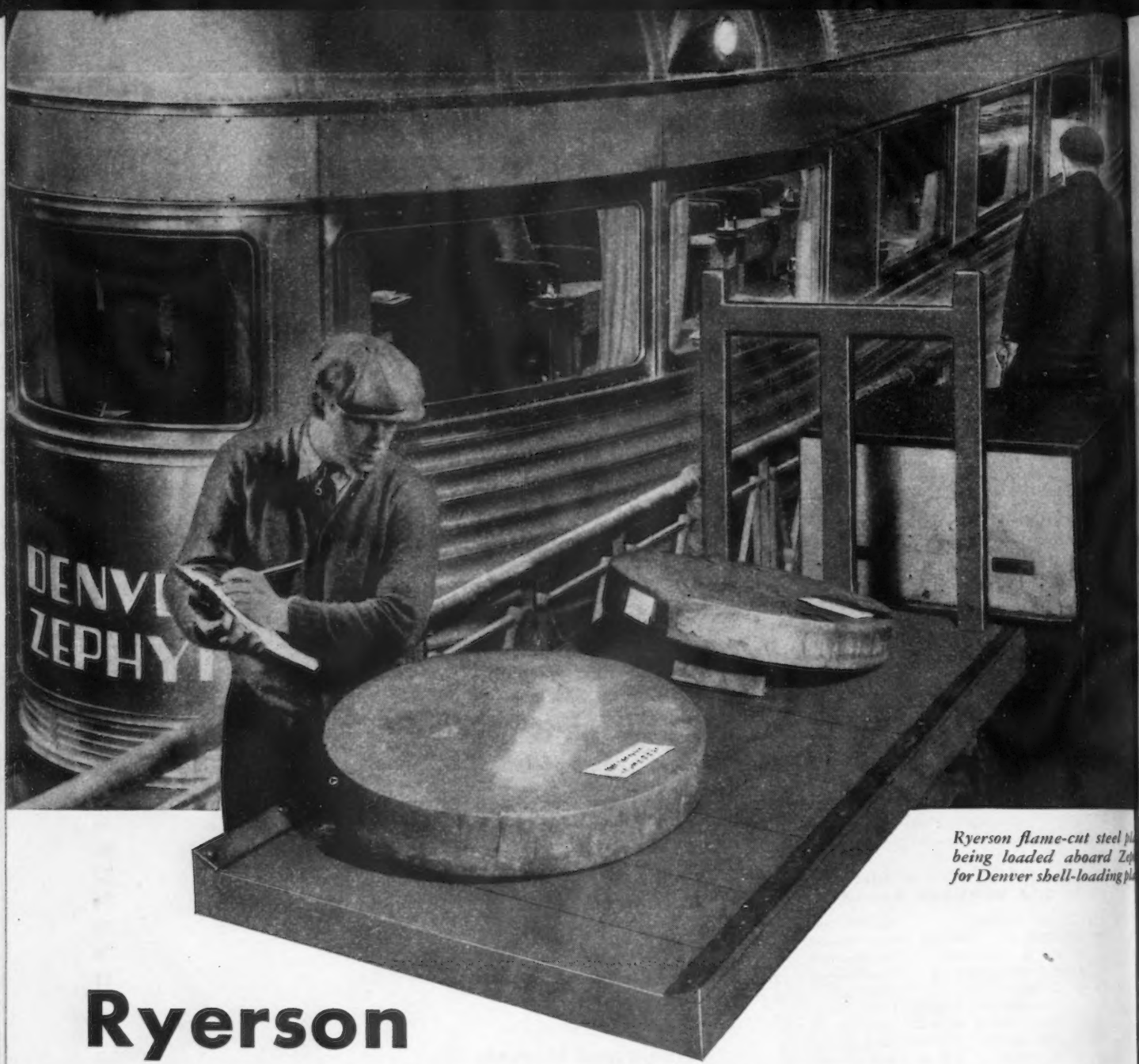


*Ryerson flame-cut steel pl*
*being loaded aboard Ze*
*for Denver shell-loading pl*

# Ryerson

## Rushes Emergency War Steel . . .

### *Prepared and delivered 1200 miles in 23 hours!*

Disaster—damaging as enemy bullets—struck a Denver shell-loading plant. An all-important casting had cracked. Weeks were needed to replace the broken part. Production of desperately needed anti-tank shells was threatened.

At 10:30 the morning of the breakdown, a Ryerson service man suggested flame cutting steel plates to the required shape. The order was immediately phoned to a Ryerson plant 1200 miles away.

Plates of a thickness needed for the job were in Ryerson stocks ready for such an emergency. Just four hours after the order reached us, the steel was cut to shape and on its way. At 5:30 that afternoon, the Denver Zephyr pulled out with the plates—still warm from the burning operation. The shell plant got its steel at 9:30 next morning. This record-breaking Ryerson delivery not only saved weeks of production time—but the flame-cut plates were stronger than the casting they replaced—and cost less!

When you have a problem of steel supply, application or fabrication that needs an extra measure of "know how", extra speed and cooperation—get in touch with your nearest Ryerson plant. Stocks in the eleven-plant network are the nation's largest, including: bars, plates, structurals, sheets, tubing, stainless, alloys and many other steel products. Service is always quick, accurate, personal. It will pay you to call Ryerson for steel.

JOSEPH T. RYERSON & SON, INC., Steel-Service Plants: Chicago, Milwaukee, Detroit, St. Louis, Cincinnati, Cleveland, Pittsburgh, Philadelphia, Buffalo, New York, Boston.

**RYERSON STEEL-SERVICE**

The
IRON AGE

ESTABLISHED 1855

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July 27, 1944

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# You Can't Paint a House With Applesauce

WHILE traveling from New York to Chicago the other day I saw a sign painted on the fence of a small town mill supply house yard. It read: "You can't paint a house with applesauce."

You must admit that this is an unusual statement and that, as the French put it, "it gave one to think."

My first thought was that in this particular town some of the residents had tried applesauce as a substitute for paint and that the experiment had not succeeded. However, this did seem like stretching the imagination a bit.

The next conclusion was that the proprietor of the place, who had had the sign painted, was a philosopher and certainly not a New Dealer. Probably he was a man who wished to reveal a profound and fundamental truth to millions of passing travelers on the Michigan Central. The more I thought about it, the more profound and far-reaching the meanings became. I realized that these seven words contained not only the essential platform for government but also for capital and labor.

Let's consider these three one at a time in relation to their use of applesauce as a substitute for the proper materials.

The famous "two chickens in every pot and two cars in every garage" was a Republican brand of applesauce. Since then we have had a veritable flood of it. Since 1932 it has been issued with a New Deal label attached to the can.

NRA applesauce, Wagner Act applesauce, debit financing applesauce, WPA applesauce, Four Freedoms applesauce, Atlantic Charter applesauce, Commander-in-Chief applesauce, indispensable man or horse applesauce are a few of the many sweet tasting but cloying brands of this commodity upon which the American public is becoming fed up.

Certainly government cannot hope to solve its many perplexing problems by smearing the public with applesauce.

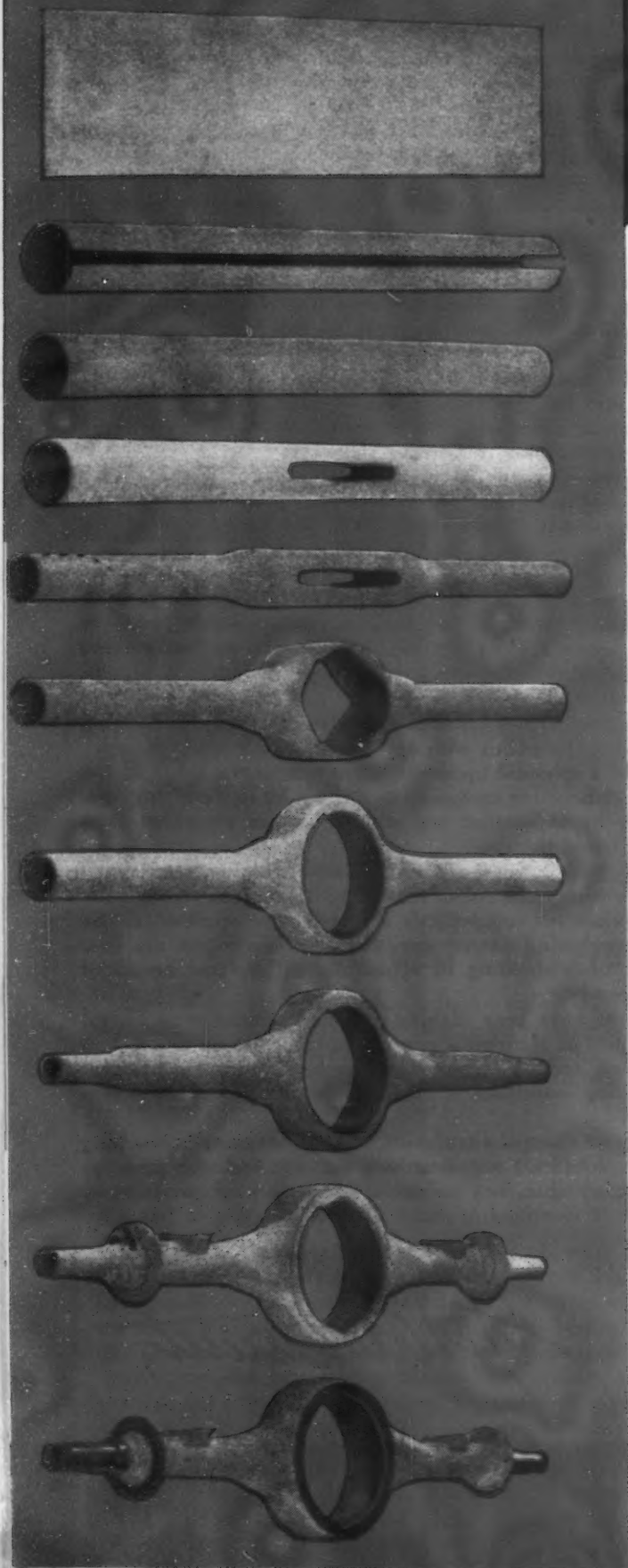
There should be a splendid opportunity for one or the other of the candidates in the forthcoming campaign to make a lot of votes for himself by discarding the applesauce and dishing us out plenty of facts and realistic plans based thereon.

Private industry and business too have dished out plenty of applesauce. Destructive competition and the thought that one's own business can be good when his competitor's is bad is pure applesauce. So is the idea that purchasing power can be high when wages are low. We need a better understanding of economics to get this brand of applesauce out of our hair.

Labor leaders too have been dishing out this commodity in liberal quantities. The policy of securing a permanent franchise on union dues through the check-off and maintenance of membership instead of earning a free and willing constituency through continued able leadership is pure applesauce.

Applesauce may be cheaper than paint, but it costs more in the long run when used as a substitute for something better. And who pays for it? The customers, whether they be taxpayers, buyers of products or wage earners.

*Inland plates, 17¼" x 68" x .335" thick, are rolled, formed and forged into truck housings in these successive steps.*



# FORMED TRUCK HOUSINGS— the Test of Fine Steel

In Buchanan, Mich., the Clark Equipment Co. produces one-piece tubular forged truck housings—a great contribution to the truck industry, and proof of the uniformity and quality of steel from Inland.

Many thousands of these housings are made from Inland plates, which are first rolled into tubes, welded by the multi arc atomic hydrogen welding process, and formed by severe cold working as well as hot working operations. The housings are then heat treated, developing a higher yield point, and higher fatigue properties. These housings have great strength commensurate with durability and toughness.

It takes uniform high quality steel to make truck housings this modern Clark way. That is why Inland steel was chosen—steel that is controlled step by step, from ore mines to finished product, by skilled technicians who daily make hundreds of tests and inspections. This job of checking and rechecking is so thorough that you can always depend on Inland Steel.

We invite you to let our Inland men help you select the right steel for finer, stronger products and more economical fabrication, whether for war or for the peace to come.

## INLAND STEEL CO.

38 S. Dearborn St., Chicago 3, Ill.

*Branch Offices:* Cincinnati • Detroit • Kansas City • Milwaukee
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The IRON AGE

July 25, 1944

# NEWS FRONT

► The Army is again showing interest in steel strip clad with gilding metal for bullet caps, and an order for 2500 tons is being negotiated. Large quantities of this material were made early in the war, but all domestic orders were cancelled six months or so ago. Russia and England have continued to take limited quantities throughout the war.

► With the Government pushing mills with continuous electrolytic tinplate equipment to turn out material with coatings of 0.75 lb. per base box, and even higher, certain technical and economic difficulties are appearing.

Most of the units were designed for very high speed at coatings of 0.50 lb. or less. Many of the machines show higher costs for coatings of 0.75 lb. than the cost of conventional hot-dip tinplate of 1.25 lb.

The brightening of this heavier electrolytic tinplate is causing some concern, also. Indications are that brightening by immersion in hot palm oil may be the favored practice.

► The production of jet engines for aircraft will soon undergo a great expansion. The War Department already has signed contracts with General Electric for 600,000 sq. ft. of floor space for manufacture of the turbines, and other companies are being lined up for compressors and other components.

The robot bombs and the use by Germany of jet fighters are factors accelerating American production of these units.

American production will be of the turbine-compressor type, for two-engine combat aircraft. This type of engine is far simpler in construction than conventional gasoline motors, but more complex and costly than the impulse type of jet chamber used by Germans on robot bombs.

► The German type impulse jet chamber is efficient and inexpensive for one or two-ton robot bombs, whereas the more efficient and expensive turbine type motor would be necessary for heavier robot bombs, as well as for fighters.

The U. S. may still use these heavy robot bombs against Japan. Statements of their inhuman aspect because of poor control need not be taken too seriously. Their use against London is little different than saturation bombing of, say, Hamburg or Berlin, at night from stratosphere bombers.

► Less than 100 out of 1000 highly skilled men inducted into the armed services are utilizing their highly trained civilian skills, a survey recently completed by the Senate Truman committee reveals.

► Ford Motor Co. is producing a weapon carrier similar to the British Bren gun carrier for lend-lease to the British. A welded steel hull is used, rather than the riveted British type. A 100 hp. Mercury engine fitted with a special Holly Lincoln automobile carburetor powers the job.

► The serious labor shortage in Canada has drastically reduced output of metal mines while steel mills are operating well below rated equipment capacity.

► In the two years following the attack on Pearl Harbor, 1,073,000 American business enterprises closed their doors and only 572,000 new businesses have been organized. A large number of these business deaths have been caused by the calling of owners into the armed forces.

► Domestic air transport officials predict that within three or four months, when a sufficient number of planes will be available to commercial airlines, priority ratings for domestic air travel may be withdrawn. By that time, Pullman railroad travel is likely to be rationed.

► Military truck losses which were approximately 32 per cent in Africa and Italy have risen to 75 per cent in France and the landings on the continent.

► Because of the severity of truck and bus tire shortage which looms ahead, orders initiated by Lt. Gen. Knudsen have placed every former tire worker in the Army or Navy still within the United States on inactive military duty to be returned to work in rubber plants.

## *Postwar Prospects For*

# Basic Electric Furnace Steel

By FRANK T. SISCO
*Secretary, Iron and Steel Division*
*American Institute of Mining and Metallurgical Engineers*

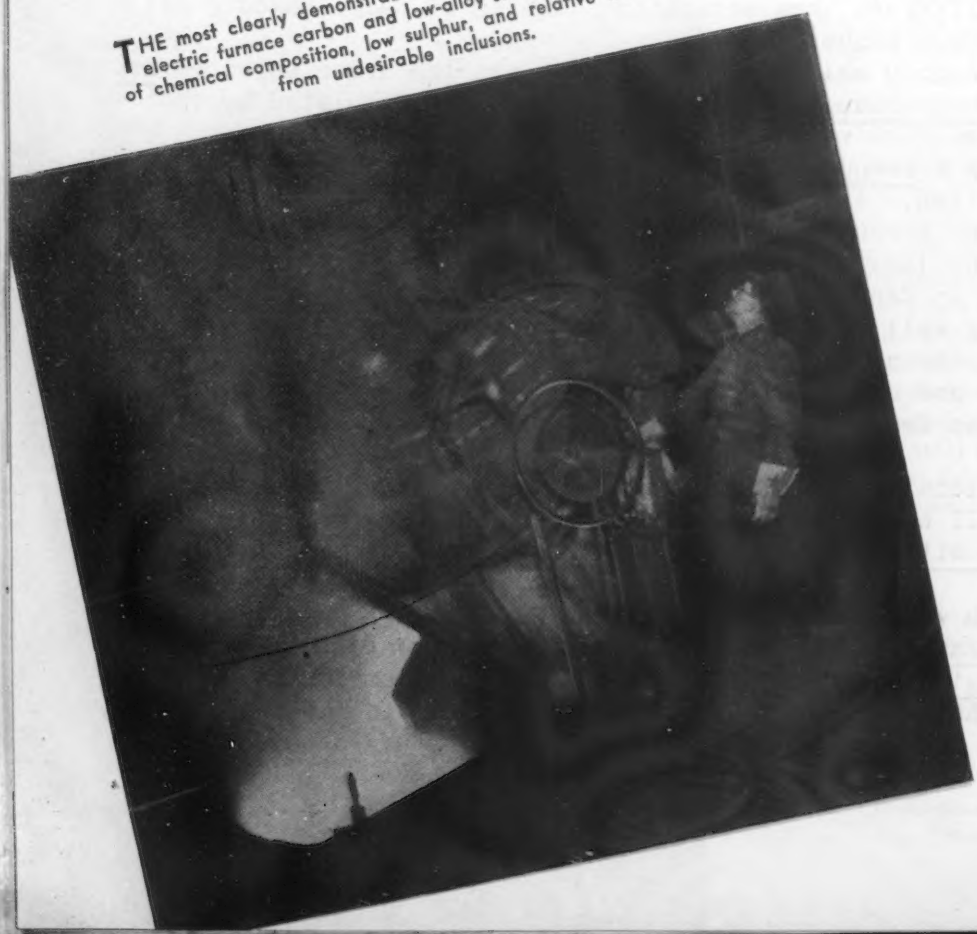
***. . . The future of much of the war-built electric furnace capacity has been subjected to a great deal of careless conjecture. To afford this subject much needed clarification, the author, an authority on steel-making operations, herein sets the technology and economics of electric furnace steels within sensible boundaries. Even further elaboration of this subject may be expected at the forthcoming Electric Furnace Conference, Pittsburgh, Oct. 5 and 6.***

GUESSING what will happen to American business when the war is won is rapidly becoming a national pastime; hundreds of high-powered brains are trying to figure it out, and the answers published to date range all the way from a sleek, raucous utopia of automatic living where the ultimate in life, love and the pursuit of happiness may be secured by manipulating a series of plastic pushbuttons, to a crash that will make the depression of the early thirties pale into insignificance. There is one thing, however, about the immediate postwar period in this country that, strangely enough, has been completely ignored by the planners; and that is, when the fighting stops, ignorance will be ignorance and not a military secret, and hundreds of businesses will lose "It's the war" as an alibi for too-high prices, poor quality, and worse service.

Fortunately this does not apply to the steel industry, and especially not to that branch producing high quality carbon and alloy steels in the basic electric furnace. With prices fixed, with inspection rigidly standardized, and with the best of service demanded by the Army and Navy, the industry does not need to take this little sermonette to heart. After the war, however, when these controls are removed the amount of electric furnace steel made and sold will depend largely upon its cost, its quality, and upon the service it gives to those who use it.

In the past four years the proportion of steel melted and refined in basic electric furnaces has increased from 2.5 to approximately 5.3 per cent; in actual production this represents an increase from 1,700,000 (1940) to 4,621,500 (1943) net tons. There is undoubtedly a considerable pent-up civilian demand for steel which, when added to the production necessary to maintain a sizable Army and Navy, should keep the whole industry producing annually around 60,000,000 tons of ingots for some years. And of this total, electric furnace steel should account for about 8 per cent, or 5,000,000 tons. This, of course, is a guess, but the guess is based upon what is believed to be a reasonable evaluation of how the electric furnace can compete wth its big brother, the basic open hearth, on the basis of cost, and quality, and upon service, which depends, in turn, on high quality at a fair cost.

THE most clearly demonstrable quality factors in favor of electric furnace carbon and low-alloy steels are uniformity of chemical composition, low sulphur, and relative freedom from undesirable inclusions.



### Cost

Electric steel has never tried in the past, and probably never will, at least in the foreseeable future, attempt to compete with the so-called tonnage products of the large integrated steel company. Plants with an ample supply of hot metal for the most economical practice (for example 45-55, or 50-50, practice where a flush slag is not usually necessary) have a cost advantage of $5 to $10 over the open hearth shop which must use a cold

charge. It is necessary, therefore, to eliminate from consideration the possibility that electric furnace steel will compete seriously on a price basis with some 80 per cent of the steel made by the basic open hearth process.

The cost of electric furnace steel should, therefore, be compared with the cost of ingots produced in the cold metal shop, or in the plant that uses cold scrap and cupola hot metal. This is a sizable part of the industry, as recently such plants have melted and poured 10,000,000 to 15,000,000 tons or more of ingots.

There are, of course, no actual comparative costs available in print, nor any that would be released for publication, but there is a cost study, made by Arthur G. McKee & Co., of two hypothetical plants having an annual capacity of 500,000 tons of ingots. This tonnage figure was used as it represents the smallest open hearth plant that could be expected to maintain a competitive position in normal times.

### *Assumption Used as a Basis for Calculating Costs*

The cost figures, for two hypothetical plants located in the Chicago district, are given in the table. The open hearth plant would cost $9 million and the electric furnace plant $5 million; capital charges would, therefore, be $900,000 and $500,000 per year, or $1.67 and $0.93 per net ton of ingots. The open hearth plant would have six 150-ton furnaces, using 30 per cent cold pig iron and 70 per cent scrap; the electric furnace plant would have eight 50-ton furnaces using 100 per cent scrap. The heat time was estimated as 13 hr. and 6 hr. respectively and the yield, metallic charge to ingots, would be 89 per cent for the open hearth shop and 93 per cent for the electric furnace plant. Both plants would produce 1500 tons of ingots a day.

The cost figures given in the table are conservative, and the source of most of them is self-evident. The others, which are likely to vary widely depending on geographic location and upon economic conditions, are based on the following assumptions (all reduced to a uniform basis of a net ton of ingots produced):

***Net metallic charge, carbon steel:***

Pig iron, $21; scrap $18.50; work ore, $5.50; ferromanganese $100; minus recovered scrap amounting to 0.044 tons per net ton of ingots.

***Net metallic charge, alloy steel:***

Pig iron and scrap, same as above; no loss of nickel in either heat; chromium loss 10 per cent in the open hearth and 5 per cent in the electric; recovered scrap same as above.

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THE future field of expansion of the electric furnace in the steel industry is primarily in the medium - carbon forging steels and in the low-alloy NE and SAE steels.

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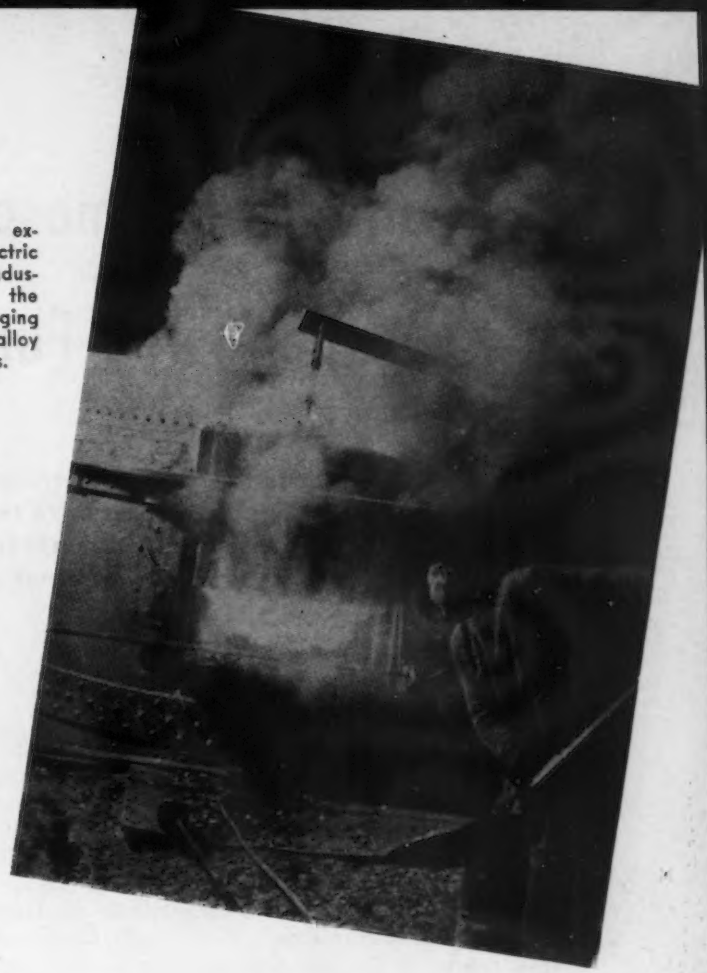

***Fuel and power for melting:***

For the open hearth: 5 million B.t.u. for the carbon steel heat, and 6 million for the alloy steel heat, at $0.0003 per 1000 ft. plus $0.06 and $0.07 respectively for atomizing steam. For the electric furnace: 600 kw-hr. for the carbon heat, and 700 for the alloy steel heat, both at seven mills.

***Electrode cost:***

Electrode consumption: For the carbon steel heat, 16 lb.; for the alloy heat, 21 lb.; both at 12½c.

Using $4.20, the melting cost of the electric furnace carbon steel heat as a basis, the cost with 5-mill power would be $3 and the cost with 10-mill power would be $6.

### *Conclusions on Cost*

It is evident from the figures in the table that, under the conditions postulated for this survey, the cost of electric furnace steel is $2 to $4 a ton higher than the cost of a comparable steel made in the open hearth from a cold charge; as compared with an open hearth plant using hot metal it would be between $6 and $15 a ton higher. Most of the higher cost is due to power, electrodes, refractories, fluxes, and labor, but the higher cost of the last three items is more than offset by the saving in capital charges.

It should be pointed out again that the figures used in the McKee estimate are conservative. In the first place, these figures do not take into account the fact that in general the electric furnace can melt lower priced grades of scrap than those that can be effectively melted in the open hearth, at least for part of the charge. In the second place the power consumption for carbon steel should be nearer 550 kw-hr. than 600, and electrode consumption is usually nearer 12 lb. per net ton than 16 lb.; on low alloy steel, power consumption should be between 600 and 650 kw-hr., rather than 700, and electrode consumption should be around 14 lb. rather than 21 lb.

Another factor that certainly should be considered, although no published data are available at present, is that the cost of the metallic charge, the cost of power, the consumption of electrodes, fluxes and refractories, and labor costs can be greatly reduced by duplexing, as practiced at the South Chicago plant of Republic Steel Corp., or by the cupola-bessemer—electric furnace combination used at the Copperweld Steel Co. plant at Warren.

Experience to date with some of the newer electric furnace installations indicates that after the war electric furnace steel will, in many localities at least, be directly competitive in cost with cold melt open hearth metal. With turnings, punchings, and other light scrap available for cupola melting at a relatively low price it will be possible (as has been shown already) to use the resulting hot

(CONTINUED ON PAGE 130)

# Control of Atmospheres in Open-Fired Furnaces

By F. A. LOCKE
*Syracuse, N. Y.*

***. . . There is a very definite need for controlling the atmosphere in an open-fired furnace. This article sets forth the variables that must be controlled, indicates the type of atmosphere most suitable, and describes how the characteristics of various atmospheres may be judged.***

THE final annealing of alloy steels is generally accomplished with some protection such as the use of prepared atmospheres, packing compounds, or sealed pipes or boxes. The other intervening heatings for forging or rolling are generally done in open-fired furnaces. When steel is heated in an open-fired furnace, the products of combustion of whatever fuel is being used, come in direct contact with the steel. The composition of this furnace atmosphere will determine the amount and type of changes which will occur in the surface of the steel as it is being heated.

There are two main changes which are produced in the surface of alloy steels as they are heated: These are (1) Formation of scale, and (2) decarburization.

The stainless grades of alloy steels do not contain sufficient carbon (generally 0.10 per cent or less) to be susceptible to decarburization. The high percentage of nickel and chromium in these grades also inhibits excessive scaling.

The tool steel grades of alloy steels do not contain sufficient nickel and chromium to protect them from heavy scaling, and these grades do contain sufficient carbon (generally about 0.70 per cent or higher) to make them highly susceptible to decarburization. The following discussions will pertain mainly to these grades of alloy steels.

### *Formation of Scale:*

In alloy tool steels containing relatively high percentages of tungsten, chromium, vanadium, molybdenum,

CHARGING a cold bloom into a gas-fired heating furnace, at the Johnstown plant of Bethlehem Steel Co.

and cobalt, the formation of excessive scale constitutes a serious loss of valuable alloys, particularly during the present war period. Although it is possible to recover by chemical reduction the major portion of these elements from the scale, it is a costly operation. Thus, the control of the amount of scale formed in any heating of these steels is very important.

***Decarburization:***

This action is undoubtedly a more important problem than scaling. Decarburized areas in the surface of alloy steels being made into tools produce inferior tools because of the resulting soft spots. Furthermore, it is difficult to detect this defect by visual examination. Thus, considerable time and money must be spent in testing for this defect. The control of the amount of decarburization formed during heating operations is very essential.

***Open-Fired Furnace Atmospheres:***

As previously stated, the composition of the atmosphere within an open-fired furnace determines what changes take place in the surface of the steel being heated. The length of time and the temperature of the treatment also influence these surface changes. However, for the purposes of this discussion it will suffice to state that an increase in time and/or in temperature will increase the degree of surface change.

The atmosphere within a furnace fired by any of the common fuels will be composed of some or all of the following components:

Carbon dioxide ($CO_2$)—Produced by the complete combustion of carbon. This gas is decarburizing and oxidizing to steel surfaces at elevated temperatures. (Analysis of the furnace atmosphere for this component will show the degree of combustion of the fuel being used.)

Carbon monoxide (CO) — Produced by the incomplete or partial combustion of carbon. This gas is carburizing, particularly to low and medium carbon steels. Carbon monoxide will not oxidize the steel but will chemically reduce the scale on the steel under correct conditions.

Hydrogen ($H_2$)—This element is present in most fuels. Natural gas and most manufactured gases contain relatively large amounts of hydrogen. Producer gas and fuel oils contain less hydrogen than natural gas, while coal contains only a very small amount. Hydrogen, when dry, is only slightly decarburizing to steel. However, in open-fired furnaces, water vapor ($H_2O$) is always present and this combination of hydrogen and water vapor is strongly decarburizing. Hydrogen will not oxidize the steel but, like carbon monoxide, will chemically reduce the scale on the steel under correct conditions.

SEAMLESS steel tube emerging from a reheating furnace. It is on its way to the sizing mill, where it will be rolled to proper size. Photo courtesy Timken Roller Bearing Co.

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Oxygen ($O_2$)—This element is required for the combustion of all fuels. The amount of this component, which will be present in furnace atmospheres, is dependent upon whether or not an excess, above the amount required to completely burn the fuel, is supplied. (It is also possible, when burning fuels which are difficult to atomize, to have uncombined oxygen present even though no excess has been supplied.) Oxygen will oxidize the steel very readily. This element is very decarburizing. Many observers believe that this element must be present in some form to produce decarburization. An example would be the case of hydrogen which, when dry, is relatively inert, but when accompanied by moisture ($H_2O$) is very decarburizing.

Water vapor ($H_2O$) — Produced by the combustion of hydrogen. This gas is very decarburizing and will oxidize the steel.

Nitrogen ($N_2$)—This element is the main component of most open-fired furnace atmospheres. Nitrogen is inert in the formation of decarburization and scale.

The majority of open-fired furnace atmospheres are comprised of the above components. However, other gases, such as those produced by the combustion of sulphur, may be present in very small quantities.

### Control Furnace Atmospheres

There are two variables which must be controlled in order to regulate the furnace atmosphere. The first variable is the ratio of air to fuel. For every fuel, there is a correct ratio of air per unit of fuel. (This is assuming correct combustion conditions, i.e., good atomization of the fuel, adequate mixing of the air and fuel, continuous ignition, correct combustion space, and sufficient flue area.) If the correct combustion conditions are provided, the air-fuel ratio will determine the degree of combustion. The correct amount of air will produce complete combustion. A deficiency of air will produce only partial combustion, while an excess of air will produce complete combustion, although free or uncombined air will be present in the furnace atmosphere.

The second variable, which must be controlled in order to regulate the furnace atmosphere, is the pressure within the furnace. Any furnace operated at elevated temperatures will act as a natural stack. Thus, all openings should be either closed or controlled

in relation to the pressure within the furnace, and the air and fuel should be introduced under a positive pressure. For example, in a furnace having a height of only 3 ft. from hearth to arch, it is possible to have a positive pressure at a level just beneath the arch, but if the flue area will pass a volume of gases greater than is being supplied, a negative pressure or draft will exist at hearth level. Thus, all flues should be covered by a damper, which can be controlled in relation to the input of gases into the furnace. A tight furnace construction must be maintained or the manipulation of the dampers will not provide furnace pressure control. If the condition of having a negative pressure or draft at hearth level is allowed to exist, air from the room will be drawn into the furnace. This will completely disrupt any attempts of controlling the atmosphere within the furnace, and will also "cool off" the region where the air enters (generally around furnace doors). Therefore, a controlled pressure within the furnace is required in order to try to establish control of the furnace atmosphere. A controlled pressure within the furnace is also essential for producing uniform heating.

If the pressure within the furnace is controlled correctly, then the regulation of the furnace atmosphere reverts to the air-fuel ratio. The following table lists the components of open-fired furnace atmospheres according to their potentialities:

| | | | | |
|---|---|---|---|---|
| $CO_2$ | CO | CO | $CO_2$ | |
| | $H_2$ | | $(H_2 + H_2O)$ | $H_2$ |
| $O_2$ | | | $O_2$ | |
| $H_2O$ | | | $H_2O$ | |
| | | | | $N_2$ |

* Pertains to decarburizing or carburizing.

The amount of any one component or any combination of components, which will be present in an open-fired furnace, will be dependent upon the fuel being used, and the degree of combustion. However, all fuels will produce either $CO_2$ or $H_2O$ or both. The discussion of these components will not refer to any specific fuel, but will cover the three classes of fuels (gas, oil, coal) in general.

The above table shows that an atmosphere composed only of $N_2$ and/or $H_2$ would be neutral to the surface of the steel. If a small amount of CO were added, the atmosphere would still be relatively neutral to a high carbon steel, but slightly carburizing to a low or medium carbon steel. Atmospheres, such as these, are used to protect steels when the work being treated is sealed in a container. This atmosphere must be generated separately. The use of containers necessitates indirect firing.

As stated before, in an open-fired furnace the products of combustion of whatever fuel is being used, come in direct contact with the work being heated. Since the combustion of all fuels produces $CO_2$ or $H_2O$ or both, it is impossible to exclude these two components from an open-fired furnace. In fact, with the exception of $N_2$, the furnace atmosphere will consist of mainly $CO_2$ or $H_2O$ or both, as the heat liberated in burning carbon (C) and CO to $CO_2$ and in burning $H_2$ to $H_2O$ is required for heating the work. If the amount of air for combustion is decreased with the idea of having $H_2$ and CO in the furnace atmosphere, a point is soon reached where the heat, produced by the amount of fuel that is combusted, is not sufficient to heat the work or to support combustion. Thus, only small amounts of CO and $H_2$ can be present in an open-fired furnace.

## Reducing Atmospheres

From the information given in the table, it would appear beneficial to have the small amounts of CO and $H_2$ present in the furnace atmosphere. The chemical reducing action of the CO and $H_2$ would help counteract the oxidizing power of $H_2O$ and $CO_2$ ($O_2$ would not be present in such an atmosphere), and a minimum of scale would be produced. Also, the carburizing effect of the CO might help offset the decarburizing power of $CO_2$, $H_2O$ and $(H_2 + H_2O)$. However, rarely do any advantages accrue from such an atmosphere, and there are several reasons why this type of atmosphere is not desirable:

Although the presence of CO and $H_2$ will result in less scale being formed, the amount that does form will be of a hard, tenacious type which can readily cause trouble in any successive forging, rolling, or pickling operation. This tight scale probably contains some actual iron metal (Fe) interspersed throughout the iron oxide (FeO). The iron would result from the reduction of the iron oxide by CO and $H_2$.

More important is the fact that if $H_2$ is present with $H_2O$, this combination has very great decarburizing power, and the small amount of CO present cannot begin to counteract this action. Thus, the presence of CO, a carburizing agent, does not provide any protection against decarburization, when using fuels which contain $H_2$, because if CO is present due to insufficient air for complete combustion then $H_2$ will also be present. When using fuels which contain very little $H_2$ (coal, etc.), it is possible to have small amounts of CO present, without having to counteract the decarburizing action of large amounts of $(H_2 + H_2O)$. However, it is impossible to provide enough CO to counteract completely the decarburizing effect of $CO_2$. In the final analysis, it is seldom possible to take advantage of the carburizing effect of CO in open-fired furnaces.

## Oxidizing Atmospheres

Since an atmosphere produced by insufficient combustion air has all the foregoing disadvantages, the probable effects of an atmosphere produced by an excess of combustion air should be examined. Such an atmosphere would contain $CO_2$ $H_2O$, excess $O_2$, and $N_2$. The table shows that all these components, with the exception of $N_2$, are oxidizing and decarburizing in their actions.

The scale formed by this atmosphere would vary in amount dependent upon the amount of excess $O_2$ present, and would be of a soft, flaky type as contrasted to the hard, tenacious type formed by a reducing atmosphere.

The soft, flaky characteristic of this scale is derived from the complete oxidation of the surface of the steel by $O_2$, $CO_2$ and $H_2O$. Also, there are no reducing agents (CO, $H_2$) present to reproduce iron from the oxide as occurs in a reducing atmosphere.

Although this type of atmosphere is composed of components which are all decarburizing, these same components are also oxidizing. This promotes a scaling action which, up to temperatures of 1500 to 1600 deg. F., proceeds at a faster rate than the decarburizing action. At temperatures above 1600 deg. F. decarburization takes place very rapidly, although a scale on the steel serves, to some extent, as a protective coating, which

(CONTINUED ON PAGE 126)

# Liquid Steel Temperatures
## measured by Thermocouple

By D. A. OLIVER and T. LAND
*William Jessop & Sons, Ltd., Sheffield, England*

***. . . The technique herein deals with a method to give a true reading of temperature variations for liquid steel being poured into a ladle, by means of an immersion type thermocouple. The results permit this method to supersede the optical pyrometer or at least to give more exact information about the corrections that must be applied to the optical pyrometer. These data are from a paper presented before the Iron and Steel Institute (British).***

THE influence of casting temperature on the quality of ingots and foundry castings is widely recognized, and in many steelworks and foundries routine observations on the casting stream are made with optical pyrometers. Such measurements are made for record purposes rather than for temperature control, so that the repetition of unsuitable temperature conditions may be avoided.

The optical pyrometer has given good service in the foundry with which the authors are particularly concerned, but its accuracy is severely limited. The temperature measured with an optical pyrometer is not the true temperature of the metal and a correction of about 130 deg. C. (235 deg. F.) is usually added to the pyrometer reading. The reading obtained depends not only on the temperature of the metal, but also on such factors as the steel composition, the degree of oxidation of the surface and the smoke which may be present between the metal stream and the observer. It is clearly desirable to devise a more accurate method of measurement, either to supersede the optical pyrometer or at least to give under experimental conditions more exact information about the correction to be applied to optical-pyrometer readings in different circumstances.

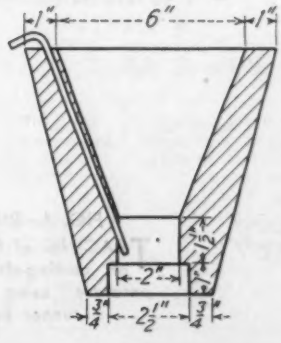
When the metal is poured over the lip of a ladle, the normal quick immersion technique using a platinum thermocouple is quite satisfactory, and accurate temperature measurements can readily be made. When the metal is bottom poured, however, the velocity of the moving stream is such that any tube put into the stream merely splays metal in all directions. It is clearly necessary to measure the temperature at some point where the metal flow is unimpeded and is constricted by a short tubular ring. The data herein describes the development of a method based on this principle.

The first "temperature ring" was made of arc-furnace electrode graphite, and the details are shown in section in Fig. 1. The thermocouple was protected by a silica tube, which projected about 1 in. from the graphite in the narrow part of the funnel. The graphite ring was mounted in a stout steel frame, so that it could be placed on a casting box over an ingot for the preliminary experiments. The greater part of the ingot was cast straight through the casting box, without passing through the graphite funnel; when the metal in the ingot reached the ingot head, the ladle was moved across and the remainder of the steel was cast through the "temperature ring." The thermocouple was connected to a Tinsley high-speed amplifier and recorder, and the record obtained is shown in Fig. 2, which also records the previous dip in the furnace and (unsuccessfully) in the launder.

The results were most encouraging, although several possible improvements were apparent. The silica sheath survived intact, although it was somewhat bent, and the thermocouple was undamaged. The graphite ring was considerably eroded by the flowing metal, and some alternative material seemed to be indicated.

FIG. 1

SECTION of graphite funnel with thermocouple in position.




As a result of the first experiment a new assembly was tried. It consisted of a "trumpet top" attached to a 2-in. ladle nozzle. This combination was built into a sand mould in place of the usual runner box. The nozzle was drilled with a ¼-in. hole at an angle of about 35 deg. to the horizontal, and a silica tube containing the thermocouple wires was introduced through the hole, protruding ¾ in. into the casting stream. When the steel was cast the silica sheath was broken and no reading was obtained. However, later experiments suggested that this assembly with slight modifications might still prove suitable for casting-stream measurements on uphill cast ingots.

### Final Design of Apparatus

The early attempts suggested a design which has given very good results. The basis was a standard runner-box, rammed with "compo," consisting of a conical refractory lining, ¾ in. thick, 10 in. deep, tapering to a minimum internal diameter of 2½ in., and provided with a cylindrical cast iron case. The refractory lining was drilled 1 in. from the bottom with a ¼-in. hole at an angle of about 35 deg. to the horizontal, and a 1-in. hole was drilled at the appropriate point in the cast-iron case. The two components of the runner box were assembled with a steel rod in place of the thermocouple tube, rammed with compo and dried out. The com-

## TABLE I

### Temperature Measurements in the Furnace and During Castings

| Cast No. | Time | Furnace Dip, Deg. C. | Power, Kw. | Tapped, Time | CASTINGS No. | Ring Couple, Deg. C. | Optical, Deg. C. | Remarks |
|---|---|---|---|---|---|---|---|---|
| A498 | 11.18 | 1625 | | | 3 | 1560 | 1435 | |
| A510 | 11.15 | 1600 | 1050 | 11.28 | 3 | 1570 | 1422 | |
| A520 | 11.56 | 1623 | 600 | 12.12 | 3 | 1550 | 1390 | Ladle about 600 deg. C. |
| A528 | 9.55 | 1592 | 1000 | 10.25 | 3 | 1560 | 1420 | |
| | 10.06 | 1619 | 1000 | ..... | 6 | 1562 | 1420 | |
| | 10.21 | 1621 | | | | | | |
| C429 | 11.39 | 1580 | 1500 | 11.53 | 3 | 1560 | 1425 | |
| | 11.50 | 1602 | 1500 | | | | | |
| A537 | 11.46 | 1610 | 900 | 12.03 | 3 | 1555 | 1438 | 0.30 per cent carbon steel |
| | 11.56 | 1603 | 1250 | | | | | |
| A539 | 13.03 | 1560 | 1400 | 13.22 | 5 | 1562 to 1568 | 1418 | 0.30 per cent carbon steel |
| | 13.15 | 1615 | 1200 | | | | | |
| A541 | 11.25 | 1580 to 1592 | 1200 | 11.47 | 3 | 1555 | 1420 | |
| | 11.36 | 1617 | 750 | ..... | 7 | 1555 | 1415 | |

plete assembly is shown in section in Fig. 3.

The thermocouple tube was a silica sheath 4¾ in. long, 0.256 in. in external diameter and 0.028 in. in wall thickness. The platinum/platinum-rhodium thermocouple wire was 0.02 in. in diameter and insulated in fine twin bore silica tubing. The head of the thermocouple unit was a standard two-way porcelain connector cemented to the silica tube. The thermocouple unit could be placed in the runner box just before casting; it was held in position with a little "Sairset" cement. About ¾ in. of the silica tube protruded into the casting stream. It was quickly found advisable to cover the thermocouple head and about a foot of the compensating lead attached to it with asbestos tubing to protect them from splashes of hot metal.

It was found that about two out of three determinations were satisfactory with this arrangement, the chief cause of failure being that the ladle operator sometimes interrupted the casting stream during casting, so that the thermocouple did not reach a steady temperature. Occasionally the silica tube broke or the bending of the tube caused a short-circuit in the thermocouple, but the majority of observations were quite satisfactory. Typical records are shown in Figs. 4 and 5.

A conical refractory lining as used in the runner box has been fitted in a steel frame and used successfully to measure the casting stream temperature during the casting of an ingot. A difficulty which sometimes arises in such measurements is that the swinging of the ladle may cause the thermocouple to be momentarily exposed every few seconds, so that it never reaches a steady temperature. This trouble can be overcome by steadying the ladle with long poles, as is usually done in the foundry.

The accuracy depends first on the thermocouple being immersed in the liquid steel for a sufficient time to enable it to attain a steady temperature. In Fig. 4 the time (12 sec.) was scarcely long enough, but in Fig. 5, 15 sec. sufficed to give a perfectly satisfactory record. It appears that the method in its present form is applicable only to castings of greater weight than 560 lb.

Another possibility of error is that the refractory lining may cool the steel before it reaches the thermocouple. Approximate calculations suggest that the cooling is unlikely to exceed 3 deg. C. (6 deg. F.) for the 784-lb. castings investigated, and is more likely to be less than 2 deg. C. (4 deg. F.). This source of error has therefore been neglected.

In quick immersion temperature

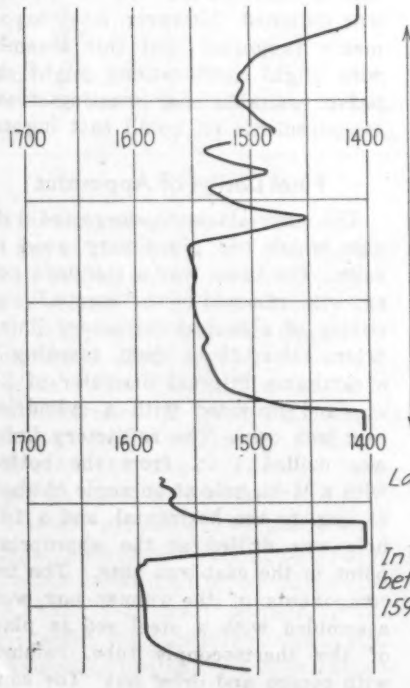
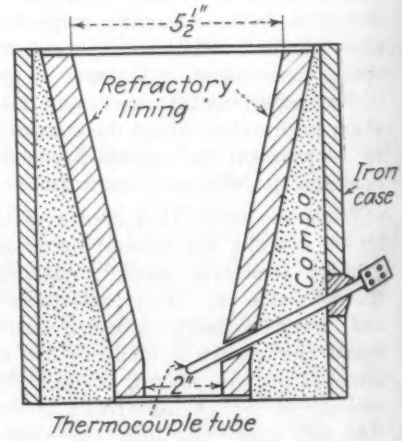



FIG. 2—LEFT
TRACING of first record of true casting-stream temperature.

FIG. 3—RIGHT
SECTION of runner box adapted to take thermocouple.



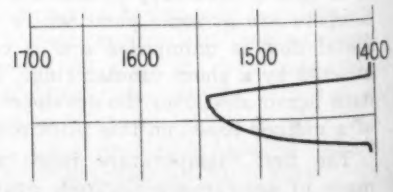




FIG. 4—RIGHT
TRACING of first record of casting-stream temperature using adapted runner box.

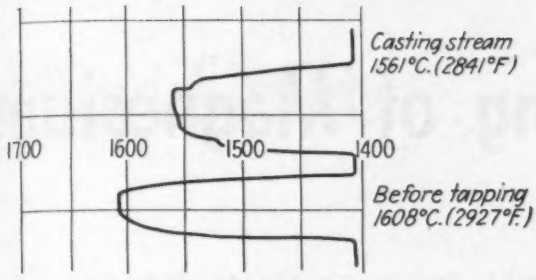



FIG. 5—LEFT

TRACING of typical pair of records showing furnace temperature and casting-stream temperature.

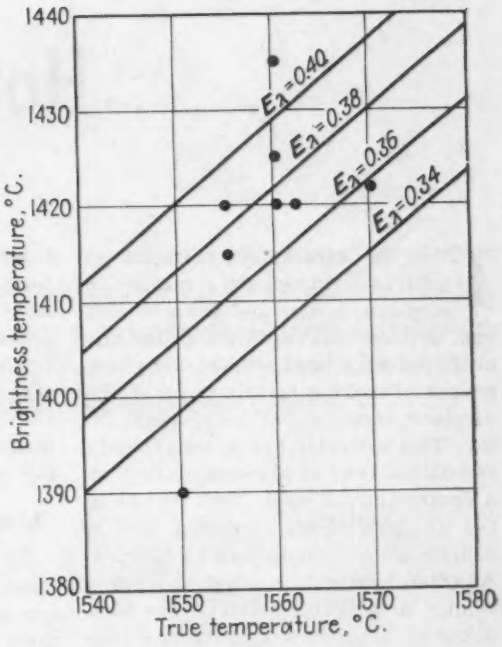



FIG. 6—RIGHT

RELATION between brightness temperature (as measured by optical pyrometer) and true casting-stream temperature for nickel - chromium - molybdenum steel.

measurements in the furnace it is usually considered necessary for the silica sheath to be immersed for at least 1½ in. from the hot junction to obviate errors due to heat conduction towards the cool part of the sheath. The greater efficiency of heat transfer in a fast moving stream appears to reduce this depth of immersion considerably, and ¾ in. of tube protuding into the flowing stream appears to be adequate.

The accuracy of the combined amplifier and recorder is of a high order (± 2 deg. C. or ± 4 deg. F.). The constancy of the amplification depends only on the permanence of a single resistor, and the overall precision is checked by reference to a Weston standard cell incorporated in the amplifier.

## Applications

To illustrate the value of the method a series of measurements was made using the "temperature ring" and simultaneously observations were made with a calibrated disappearing filament optical pyrometer. Temperature measurements were also made in the furnace before tapping. In this way the emissivity and the ladle cooling of the steel were measured, two quantities of particular interest to the Foundry Steel Temperature Sub-Committee.

The measurements were made on a nickel - chromium - molybdenum steel which was, at the time of these experiments, in regular production under closely standardized conditions. A typical analysis was as follows:

| | Per Cent |
|---|---|
| Carbon | 0.40 |
| Manganese | 0.60 |
| Silicon | 0.25 |
| Nickel | 2.50 |
| Chromium | 0.80 |
| Molybdenum | 0.65 |

The steel was made in a 12-ton basic electric arc furnace, and cast from a ladle lined with fireclay bricks. The metal was poured from the bottom of the ladle through a magnesite nozzle with a fireclap stopper end, previously boiled in tar.

The optical pyrometers, manufactured by the Cambridge Instrument Co. and by Hartmann and Braum were calibrated within 24 hr. of each observation against a tungsten ribbon-filament lamp standardized at the National Physical Laboratory. The ladle was heated by a gas burner to a temperature of approximately 650 deg. C. (1200 deg. F.) before tapping. The metal was held in the ladle for 10 min. before casting. The majority of observations were taken on the third 784-lb casting.

The experimental results are given in Table I.

The emissivity of liquid steel is the ratio of the radiant energy emitted per unit area of the steel surface to the energy radiated by a perfect black body at the same temperature. Since the human eye in conjunction with the red filter of the optical pyrometer only responds to radiation in a narrow band of wave-lengths, the emissivity ($E\lambda$) being considered here is the "spectral emissivity" at the effective wave-length ($\lambda_e$) of the optical pyrometer. The effective wavelength was approximately 0.65 micron. The relation between true temperatures (T) and apparent temperature ($T_{app}$) is given by:

$$\frac{C_1}{\lambda_e^5} e^{-\frac{C_2}{\lambda_e T_{app}}} = E\lambda \cdot \frac{C_1}{\lambda_e^5} \cdot e^{-\frac{C_2}{\lambda e T}},$$

where $C_1$ and $C_2$ are Wien's radiation constants. It was not always practicable to make a temperature measurement in the furnace immediately before tapping the metal into the ladle. The relation between the power input to the furnace as indicated on the watt-meter and the rate of rise of temperature had previously been determined as accurately as possible; this relation was used to estimate the true temperature of the metal as it left the furnace. In most cases the furnace was tapped within 10 min. of the last dip measurement in the furnace, and the estimated temperature change during the period was between 3 and 17 deg. C (5 and 31 deg. F.).

The measurements of the true casting stream temperature measured by the authors' new method and of the brightness temperature measured optically are correlated in Fig. 6. The majority of the observations lie in the neighborhood of the line corresponding to an emissivity of 0.38. The only point seriously out of accord is that for a brightness temperature of 1390 deg. C. (2534 deg. F.). It seems probable that there was interference with the optical reading due to smoke during this observation. The correla-

(CONCLUDED ON PAGE 124)

TABLE II

Ladle Cooling Readings

| Cast No. | Tapping Temperature, Deg. C. | Casting Stream Temperature, Deg. C. | Ladle Cooling, Deg. C. |
|---|---|---|---|
| A510 | 1617 | 1570 | 47 |
| A520 | 1620 | 1550 | 70 |
| A528 | 1626 | 1561 | 65 |
| C429 | 1608 | 1560 | 48 |
| A537 | 1615 | 1555 | 60 |
| A539 | 1627 | 1565 | 62 |
| A541 | 1622 | 1555 | 67 |

# . . . Hot Forming of Magnesium

IT is of cardinal importance to achieve lightness of structure in airplane design and towards this end, development engineers in the aircraft industry have studied the possibilities of making certain parts of the airplane structure of magnesium alloy. This material has a weight only two-thirds that of aluminum alloy, or a fourth that of steel. Thus its use in the airplane structure means that a definite weight saving can be effected. As often happens in industry, when a change to a lighter material has been achieved, ideas in simplicity of structure are also suggested.

The possibilities of this material are now being explored to the utmost by the industry. The consensus of opinion among engineers is that the time is not yet ripe for this material to displace aluminum alloy in aircraft structure. Its low ductility in the cold state, susceptibility to corrosion and high notch sensitivity are the greatest drawbacks of magnesium alloy in the sheet form. Magnesium alloy in the form of castings, forgings and extrusions have already been found to have practical applications in aircraft as far as load carrying parts are concerned. So far, magnesium alloy in sheets has been restricted to fuel tanks and non-structural parts requiring very little or no forming.

## Magnesium Development Program

In order to obtain experimental data and fabrication experience for use in the design of structural parts from magnesium alloy, a magnesium development program was instituted in the latter part of 1943 by the Consolidated Vultee Aircraft Corp. at Vultee Field. Another part of the program was to determine what special equipment, if any, would be required for the fabrication of structural parts and to explore necessary surface treatments for improving the metal's resistance against corrosion. It was also intended by these investigations to determine the advantages and disadvantages of this material with particular emphasis on its structural applications on aircraft.

Outstanding conclusions derived from this investigation are given below:

1—With proper equipment, magnesium alloy sheets can be formed at elevated temperature to nearly any shape commonly formed in aluminum alloy. It is possible to hold the internal structure unchanged from conventional design and to use a magnesium alloy covering with local stiffness equal to that of aluminum alloy at a considerable saving in weight. (See Tables I and III.) Another possibility is to use covering of equal weight but to obtain structural simplification by decreasing the number of formers. These advantages can be gained with negligible loss in bending stiffness of the structure. Static and fatigue tests have indicated the satisfactoriness of this type of structure.

2—Complete structures can be constructed from magnesium alloy with a considerable saving in weight and a decrease in stiffness if O-1 alloy extrusions in the heat treated and aged conditions are used for concentrated members. However, there is some question as to whether the weight saving in severely formed members is sufficient to balance the extra expense and complications required for hot forming. Considerations should be given, then, to the use of aluminum alloy for ribs and other severely formed members, with magnesium alloy covering. If space and stiffness considerations allow, magnesium alloy should be considered for such parts as spar flanges.

3—The use of magnesium alloy for wholly shell type structures can be recommended in cases where stresses are high enough to justify thick skin and where the radius of curvature is small enough to result in high compressive strength. With careful design, weight saving and simplification of structure can be obtained.

4—The use of magnesium alloy for tabs and trailing edge ribs in control surfaces results in great weight saving and is strongly recommended.

5—The calculated weight saving will not be realized entirely because

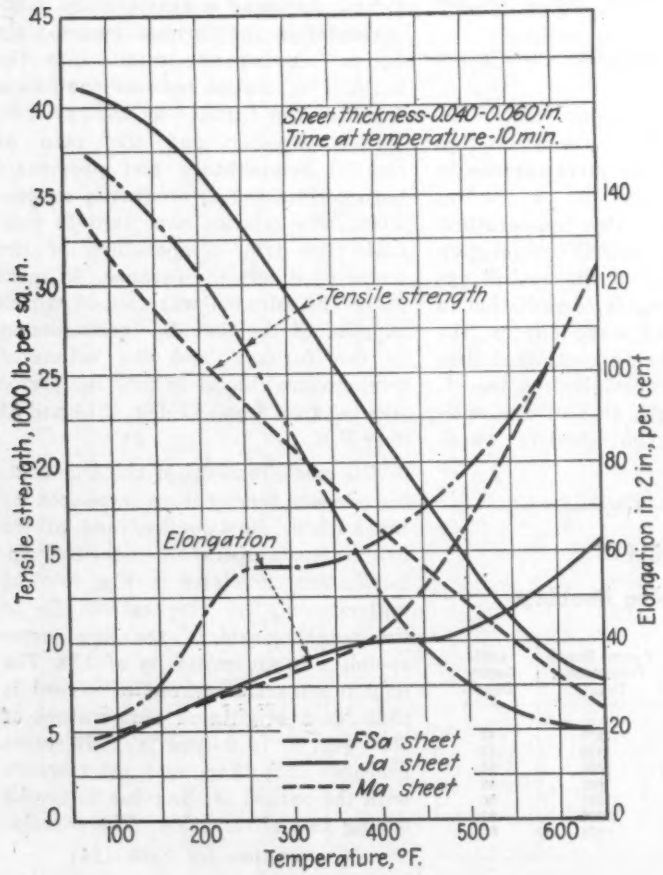



FIG. 1—Curves showing how tensile strength and elongation vary with temperature for FSa, Ja, and Ma Dowmetal sheets.

# Alloy Sheets . . .

o o o

By E. P. RESOS
*Development Engineering Group*
*Consolidated Vultee Aircraft Corp.,*
*Vultee Field, Cal.*

o o o

***. . . The weight saving factor is the ever-constant spur to explore the possibilities of magnesium alloys in aircraft structures. In this article a summary is given of voluminous experimental investigations recently carried out at Vultee Field, which should be of basic interest to production and designing engineers.***

o o o

the weight of finishing material required for magnesium alloy is ordinarily greater than that for aluminum alloy.

6—Arc welding is entirely possible, particularly in heavy sheet and bulky fittings. Its use in thin or nearly flat sheet should be avoided due to warpage difficulties. Attainment of proper stress relief after welding is somewhat uncertain.

A summarization of forming operations, such as drop hammer forming, hydraulic press forming, brake bending and dimpling on a number of magnesium alloys of different characteristics and thicknesses will now be described.

## Materials

There are a number of alloys of varying physical characteristics available to the industry in sheets both in annealed and hard-rolled tempers. In this investigation the annealed material was used only on parts requiring some amount of forming and subject to little or no load, while the hard-rolled material was used on parts with moderate or no forming and requiring higher yield. The following alloys were used:

Dow Chemical Ma, J-1h and O-1 HTA alloys

American Magnesium AM-C52S-O and AM-C52S-H alloys

Their specifications and mechanical properties are listed in Tables I and II.

A study of Table I shows that magnesium alloy skin has very interesting possibilities due to its greater bending stiffness and stability for the same weight as aluminum alloys.

Table III gives comparisons of weights and deflections between magnesium and aluminum parts of similar cross-sections carrying equal loads or resisting equal bending moments. This table was compiled from results of computations based on theoretical considerations, established by the investigators.

By inspection of column 4 of the table, with the exception of two cases, magnesium shows the greater strength-weight ratio than aluminum. However, in column 5 it is shown that magnesium gives the greater deflection. Since the reciprocal of the deflection ratio (column 5) is very nearly equal to the weight ratio (column 4), it may be concluded that for equal weights the deflections for the two materials will be approximately the same.

On monocoque structures or web-beams, buckling of the skin or web is critical. By Case 4 of the table, it may be shown that the substitution of mag-

TABLE—I

Magnesium Alloys and Their Mechanical Properties

| | Commercial Designation | | | | | Tension | | Compression | |
|---|---|---|---|---|---|---|---|---|---|
| | Dow Chemical | American Magnesium | A.A.F. | NAVY | Condition | Ultimate Lb./Sq. In. | Yield Lb./Sq. In. | Ultimate Lb./Sq. In. | Yield Lb./Sq. In. |
| Sheets | Ma | AM-3S-O | 11339 Cond. A | 47 M2 Alloy 11 Cond. A | Annealed | 30,000 | 14,000 | | 7,000 |
| Sheets | J-1h | AM-C57S-H | 11338 Cond. H | 47 M2 Alloy 8 Cond. H | Hard rolled | 42,000 | 33,000 | 54,000 | 20,000 |
| Sheets | FS-1a | AM-C52S-O | 11340 Cond. A | 47M2 Alloy 18 Cond. A | Annealed | 32,000 | 17,000 | 10,000 | |
| Sheets | FS-1h | AM-C52S-H | 11340 Cond. H | 47M2 Alloy 18 Cond. H | Hard rolled | 38,000 | 26,000 | 15,500 | |
| Extr. | O-1HTA | | | | Heat treated and aged | 48,000 | 33,000 | | 30,000 |

Note: Mechanical properties given here are taken from latest available data from Dow Chemical Co. and American Magnesium Corp.

nesium for aluminum will result either in big weight saving or increase in lateral stiffness of the sheet.

### Notes on Forming

Magnesium alloys harden rapidly when formed cold so that cold forming has very little practical application in aircraft work. Most successful forming of magnesium alloys is accomplished at elevated temperature between 300 and 750 deg. F., depending on the alloy used, gage of material and severity of forming. Slow forming produces better results than rapid forming. In some cases, it may be necessary to repeat the forming operation two or more times to achieve the desired results. Magnesium can be formed at proper working temperature to most of the shapes commonly used in aluminum alloy. However, some changes in the processes and equipment now in use will be required.

Heat can be applied in several ways, such as:

(a) Heating the part in an oven before it is placed in the press, or by a blow torch where forming is over a small area.

(b) Heating the dies electrically or by gas.

(c) By passing a stream of hot air over part and dies during forming.

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RIGHT

FIG. 2—Curves showing how tensile strength and elongation vary with temperature for FSH, Jh and Mh Dowmetal sheets.

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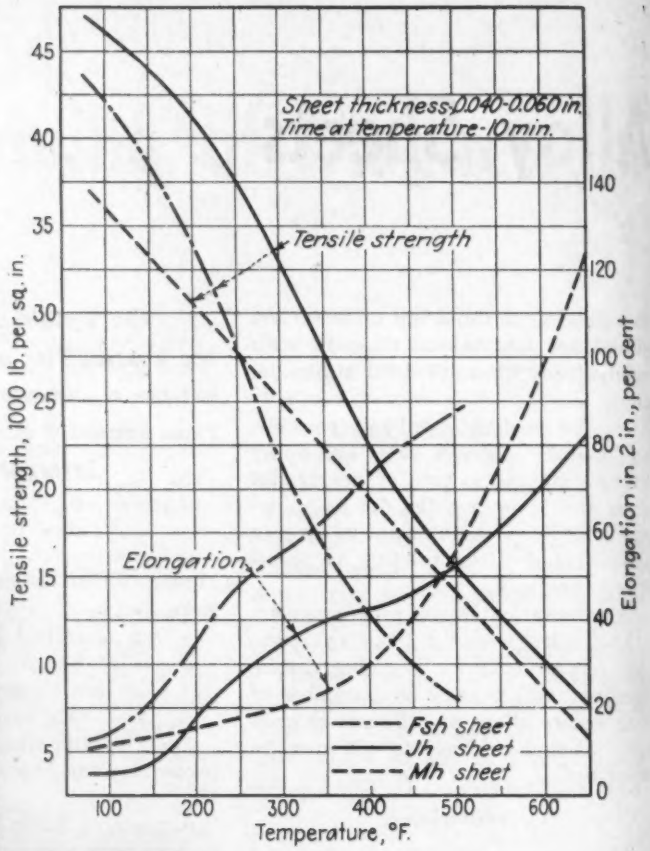


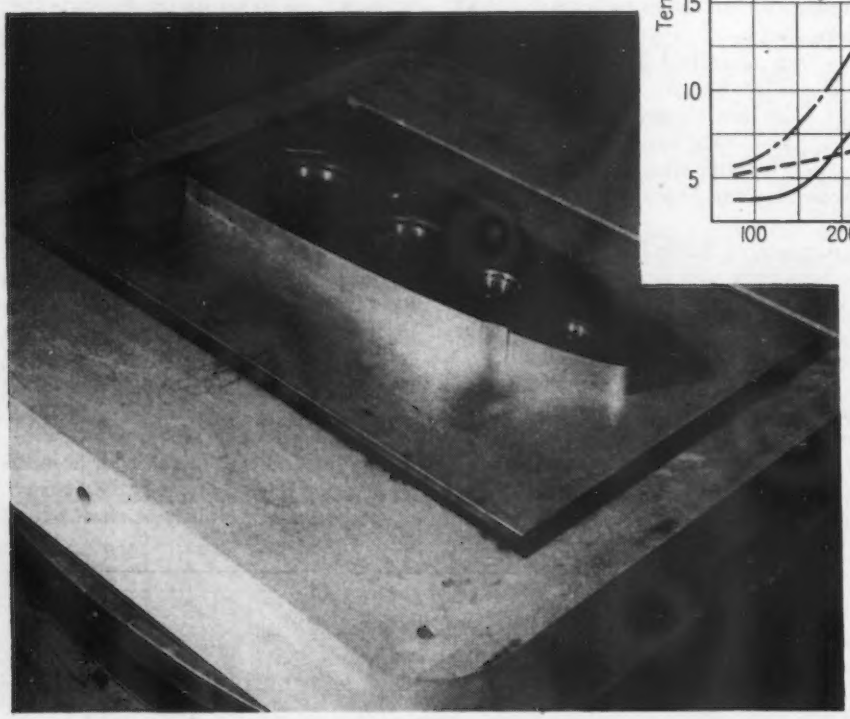

ABOVE

FIG. 3—Showing a form block, hot plate, insulation and wood platform mounted on the hydraulic press.

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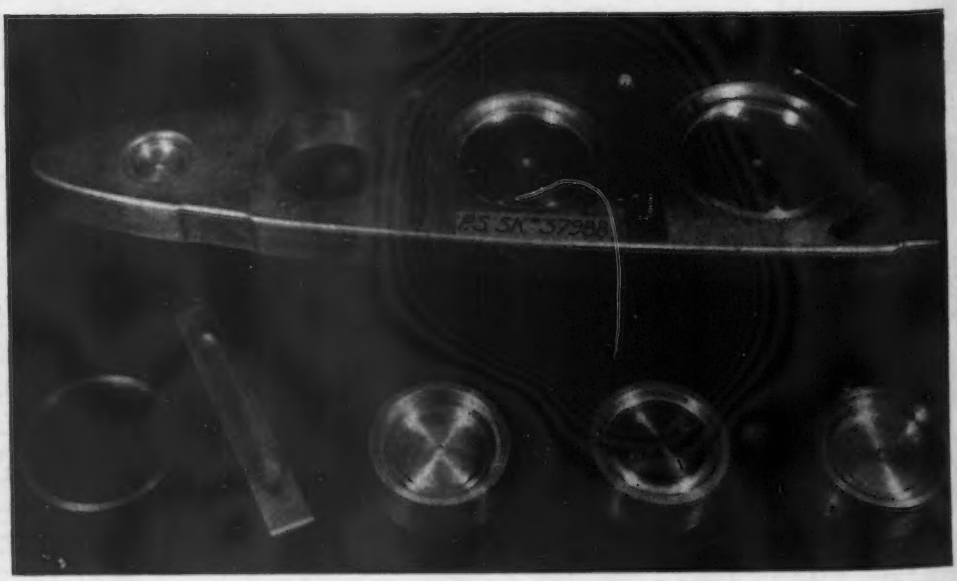
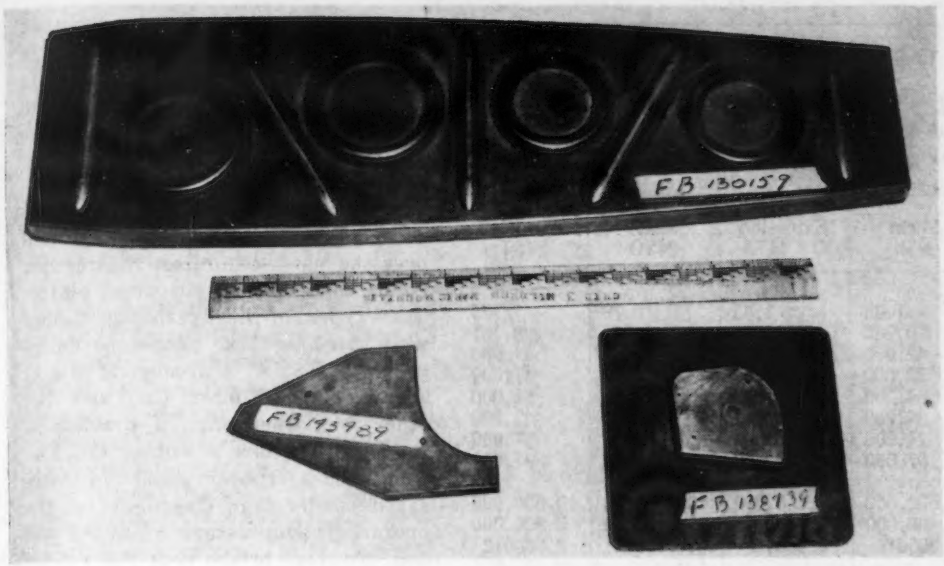
RIGHT

FIG. 4—Form blocks and inserts used for forming ribs in the hydropress. This form block was made of magnesium casting.






LEFT

FIG. 5—These form blocks were made of steel used on the production parts. They were chosen because form block FB130159 (top) had raised heads and lightening holes and could be compared with form block in Fig. 4; the small nose rib FB138739 (right) is for a shrink flange, and FB143489 (left) for stretch flange.

o o o

BELOW

FIG. 6—These ribs were formed of magnesium and aluminum alloys on the magnesium block shown in Fig. 4. Note failure of J-1h material (top).

(d) By using hot oil in forming the part hydraulically.

Greater care must be exercised in forming magnesium alloys in the drop hammer and hydro-press than in forming aluminum alloys. Surface scratches and sheet imperfection are apt to produce cracks during forming operation. Parts must be formed perfectly on the form block to avoid the necessity of cold forming afterwards. Hard-rolled alloys should be used only where forming is very moderate and high yield material is required; otherwise, the annealed material should be used.

Curves in Figs. 1 and 2 show how tensile strength and elongation vary with temperature for 0.040 to 0.060 in. materials. These data may be used to determine approximately the formability of the material at elevated temperatures.

## Drop Hammer Forming

Kirksite dies and lead punches used for aluminum alloys were used in this operation for the different magnesium alloys in order to obtain comparative data. The alloys investigated were Ma, J-1h and AM-C52S-H.

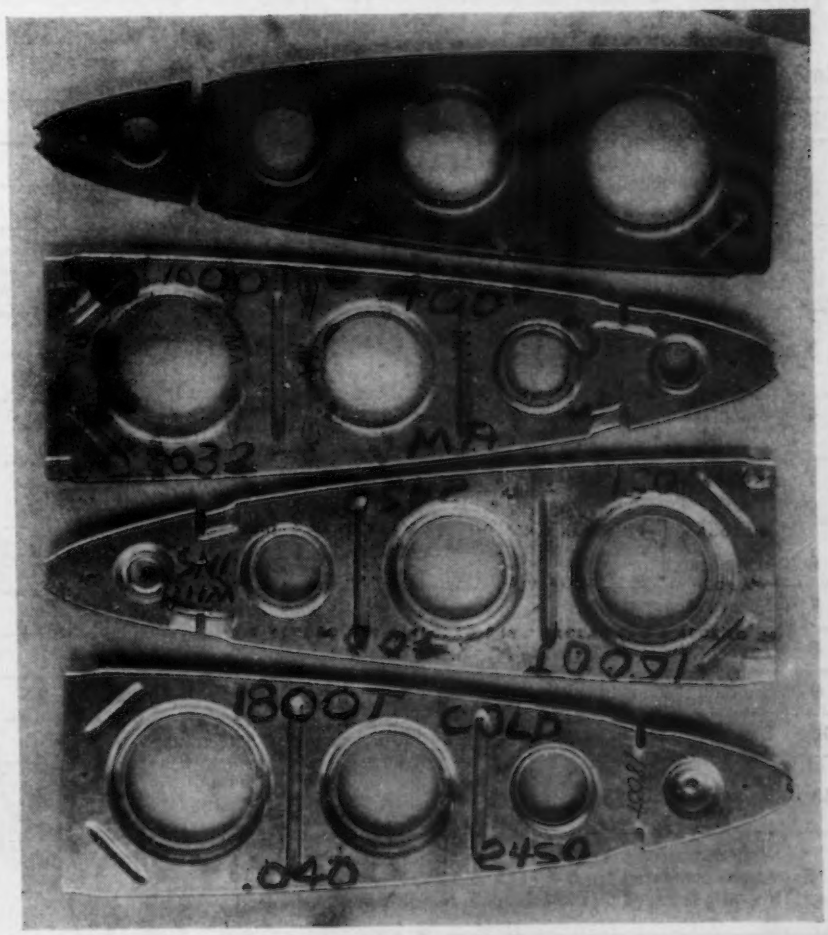
The blank was first painted on both sides with a lubricant obtained from the Acheson Colloids Corp. known as "dag" collodial graphite in oleum spirits, dispersion type 2404, which was mixed with carbon tetrachloride in a mixture of approximately one part of graphite to 50 parts of carbon tetrachloride. Then it was placed inside the oven for about 10 min. at the proper working temperature. (Dow Chemical reports that Acheson Colloids Corp. graphite dispersion PD-41 gives better results). After the blank is heated, it is placed on the cold die and then the punch is lowered instantly.

In forming J-1h material the parts were heated to not more than 400 deg. F. to prevent annealing. For severe forming of this alloy it was necessary to hit it part of the distance with the punch the first time, then reheat the blank and hit it with the punch a little further into the cavity of the die. In some cases it was necessary to repeat the above operation two or more times before the part was bottomed in order to avoid cracking or tearing the sheet.

The Ma and AM-C52S-H materials formed better than the J-1h. Generally speaking, the magnesium alloys have more spring back than the aluminum alloys and, therefore, the dies have to be designed accordingly.

## Hydropress Forming

In hydropress forming, the heat was applied to the form blocks by placing them on the top of a hot plate



## TABLE—II

### Comparison of Mechanical Properties of Magnesium and Aluminum Alloys

| | * Magnesium Alloy | | * Aluminum Alloy | |
|---|---|---|---|---|
| | Sheet J-1h | Extrusion O-1 HTA | Sheet 24SO | Extrusion 24ST |
| Spec. gravity | 1.83 | 1.83 | 2.79 | 2.79 |
| Weight, lb./cu. in. | 0.065 | 0.065 | 0.101 | 0.101 |
| Tension ultimate, lb./sq. in. | 42,000 | 48,000 | 62,000 | 61,000 |
| Tension yield, lb./sq. in. | 33,000 | 33,000 | 46,000 | 47,000 |
| Comp. ultimate, lb./sq. in. | 54,000 | **60,000 | 62,000 | 61,000 |
| Comp. yield, lb./sq. in. | 20,000 | 30,000 | 48,000 | 43,000 |
| Shear ultimate, lb./sq. in. | 21,000 | 25,000 | 39,000 | 37,000 |
| Bearing ultimate, lb./sq. in. | 67,000 | 77,000 | 90,000 | 91,000 |
| Elongation in 2 in., per cent | 7 | 5 | 10 | 12 |
| Mod. of elast., lb./sq. in. | 6,500,000 | 6,500,000 | 10,500,000 | 10,500,000 |
| Mod. of Rigidity, lb./sq. in. | 2,400,000 | 2,400,000 | 3,900,000 | 3,900,000 |
| Coef. of thermal expans., per deg. F. | 0.000016 | 0.000016 | 0.000012 | 0.000012 |

* Weight of mag. alloy ÷ Weight of alum. alloy = 0.644

** Assumed value.

## TABLE—III

### A Table of Comparison of Weights and Deflections Between Magnesium and Aluminum Structural Elements Carrying Equal Loads or Resisting Equal Bending Moments

| Case | Critical Stress | *Material | $\frac{W_m}{W_a}$ | $\frac{S_m}{S_a}$ |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | †5 |
| 1 | Direct tension | Sheet | .95 | 1.09 |
| | | Extrusion | .82 | 1.27 |
| 2 | Block compression | Sheet | .74 | 1.41 |
| | | Extrusion | .66 | 1.59 |
| 3 | Compression Yield | Sheet | 1.55 | .67 |
| | | Extrusion | .92 | 1.13 |
| 4 | Compression, bending or shear buckling of flat panels | Sheet | .75 | 1.38 |
| 5 | Compression buckling of skin of thin-walled cylinder | Sheet | .82 | 1.27 |
| 6 | Long column | Extrusion or bar | .82 | 1.27 |
| 7 | Shear (shear resistant) | Sheet | 1.20 | |
| 8 | Tension (tension field web) | Sheet | .95 | |
| 9 | Bending (rectangular beam of equal depth) | Ext. or bar | .82 | 1.27 |
| 10 | Bending (rectangular beam of equal width) | Ext. or bar | .73 | 1.12 |
| 13 | Bending (similar sections of equal weight) | Box or semi-monocoque | 1.00 | 1.04 |

* Sheets compared are J-1h magnesium and 24SO aluminum
Extrusions compared are O-1 HTA and 24ST.
† This ratio is based on deflections in the direction of the load.

electrically heated to a temperature of about 400 deg. F. In Fig. 3 is shown the form block and hot plate on the press table. The cold blanks are laid on top of the form blocks until they are heated to the proper working temperature. Then a heat resisting rubber blanket, big enough to cover the entire hot plate, is placed over the parts to protect the regular rubber pad in the hydropress platen. Two types of heat-resisting rubber were tried in these tests—one designated as X82-A, a product of the L. A. Standard Rubber Co., and the other was Chemigum, a product of the Goodyear Tire & Rubber Co. The type X82-A rubber stood up more satisfactorily than Chemigum at the operating temperature of about 400 deg. F. Due to the heat the rubber blanket had a tendency to stick to the parts and the hot plate. In order to prevent this, flaked mica was sprinkled between the parts, the hot plate and the rubber blanket.

The materials used in this investigation were J-1h, Ma, AM-C52S-O and AM-C52S-H alloys. Some 24SO and 24ST aluminum alloys were also tried for comparison.

Form blocks used in this investigation are shown in Figs. 4 and 5. These form blocks represent all types of hydraulic press forming, such as plain straight flange, stretch flange, shrink flange, joggles, flanged lightening holes, raised beads and depressed beads. As expected, stretch flange formed very well on materials used on form block No. 143489 in Fig. 5.

Stretch flanges formed well on all materials as long as the radius of curvature was not very sharp and stretching is confined to one direction only. On shrink flanges, especially around the severest part of the contour, due to their instability, the flanges had a tendency to buckle rather than compress. This condition is more noticeable on lighter gage material than on heavier gage. This buckling of shrink flanges may be reduced or eliminated entirely by the use of more reliefs, or blisters near the affected area, to absorb displaced material, or by using shrink dies and increasing the working pressure.

Joggles usually cause wrinkles on flanges. These are easily prevented by adding blisters near the joggles to take the metal displaced by the joggles. Depressed beads formed better than raised beads, because in the latter the rubber was unable to force the metal down far enough into the sharp fillet around the beads. As in the case of beads, depressed lightening holes formed better than the raised type. The only difficulty encountered with lightening holes was

the shearing of the holes, because sufficient pressure could not be concentrated in the area of the holes. It was concluded that holes in the die should be made with a flat bottom and holes cut after forming. Fig. 6 shows some ribs formed in the hydropress using the form block shown in Fig. 4.

To determine minimum radii for different gages and alloys a form block was made of 24ST aluminum alloy for 10 different bend radii, from 1/32 to 5/16 in. inclusive, in increments of 1/32 in. Right angle bends were made at 400 deg. F. and at room temperature. The form block used in the determination of the minimum bend radii was form block C shown in Fig. 7. Table IV shows results of these tests. Values given in the table should be used for bends by hydropress not greater than 90 deg.

### Brake Bending

Minimum bend radii for magnesium alloys, both hot and cold, are listed in the available literature from numerous experiments. All are in fairly good agreement. On the basis of tests with brake bending of J-1h sheet, some sheets have been bent successfully over sharper radii than the recommended minimum.

Fig. 8 shows an experimental heated brake die. Note that the heated parts are insulated from the brake with Transite. Since this worked fairly successfully, longer dies of the same type were made for fabricating parts. However, it was found that the hot bending of one edge of a large sheet offers difficulties, due to the uneven temperature of the sheet. Expansion of the heated edge is prevented by the cold portion with the result that warping occurs when the heated portion cools. The warp can be removed only by clamping the sheet to the desired shape and heating to 400 deg. F., a process similar to the stress relieving of welds. Therefore, the forming of magnesium alloy sheet in such a

**TABLE—IV**

**Comparison of Ma, J-lh, AM-C52S-O, and AM-C52S-H Minimum Bend Radii at 400 deg. F.**

| Gage | Ma | J-1h | AM-C52S-O | AM-C52S-H |
|---|---|---|---|---|
| 0.020 | 1/32 | 1/16 | .... | .... |
| 0.032 | 1/16 | 3/32 | .... | 1/32 |
| 0.040 | 3/32 | 1/8 | 1/32 | 1/16 |
| 0.051 | 1/8 | 5/32 | 1/16 | 3/32 |
| 0.064 | 5/32 | 1/4 | 3/32 | 5/32 |
| 0.081 | .... | 9/32 | 3/32 | 3/16 |
| 0.091 | .... | 5/16 | .... | 7/32 |
| 0.102 | .... | .... | .... | .... |
| 0.128 | .... | .... | 5/32 | 9/32 |
| **AT ROOM TEMPERATURE (70 deg. F.)** | | | | |
| 0.020 | 1/16 | 5/32 | .... | .... |
| 0.032 | 1/8 | 11/32 | .... | 9/32 |
| 0.040 | 5/32 | over 3/8 | 1/16 | 5/16 |
| 0.051 | 7/32 | .... | 1/8 | 3/8 |
| 0.064 | 1/4 | .... | 5/32 | .... |
| 0.081 | .... | .... | .... | .... |
| 0.091 | .... | .... | 3/16 | .... |
| 0.102 | .... | .... | .... | .... |
| 0.128 | .... | .... | 5/16 | .... |

**The above tests were made on 2 in. wide specimens on block C, Fig. 7. Edges were not cleaned up.**

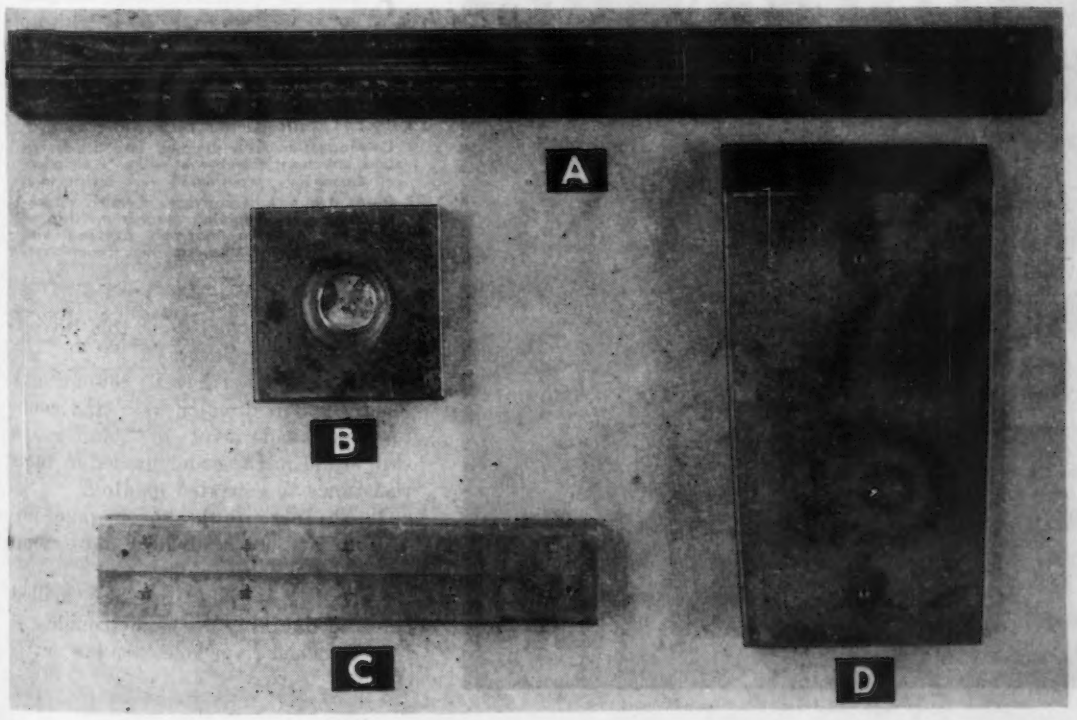



**FIG. 7—Form block *A* was made of cast Kirksite, and was used to form channel sections for elevator and rudder ribs. Form block *B* was the first cast Kirksite made which was used to determine the feasibility of using Kirksite blocks for hot forming and shearing at 400 deg. F. Block *C* was made of 24ST aluminum and had ten different radii on the edges ranging from 1/32 to 5/16 in. radius inclusive, in increments of 1/32 in. This block was used to check bend raddi at room temperature and at 400 deg. F. (See Table IV) The block *D* was of cast Kirksite and was used to form a stabilizer rib.**

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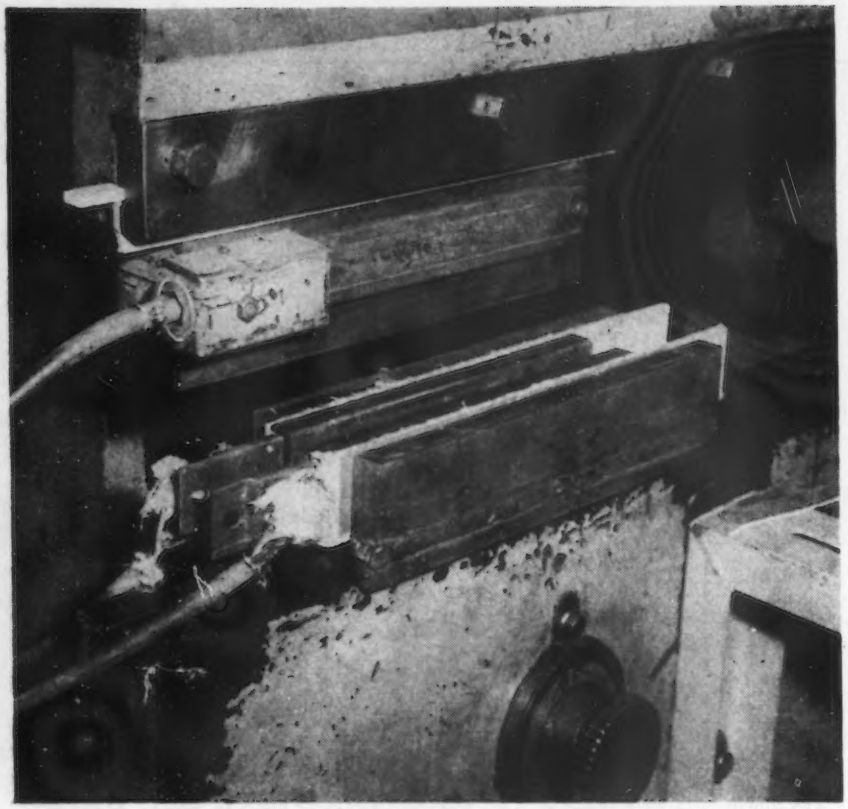


ABOVE

FIG. 8—Experimental heated brake die for bending magnesium sheet.

o o o

BELOW

FIG. 9—Setup in hand arbor press for hot dimpling magnesium alloy sheets.

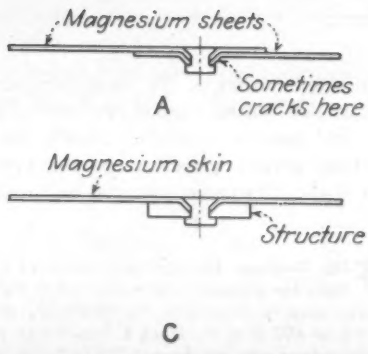
manner that the whole cross-section cannot be heated uniformly cannot be recommended.

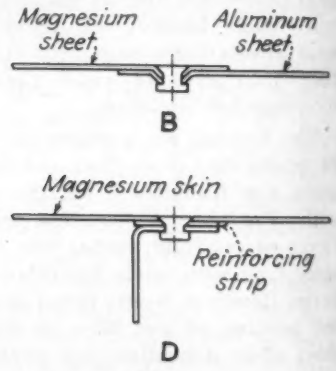
## Dimpling

Like the other forming operation, dimpling can best be done at elevated temperatures. A heatable punch and die capable of heating up to 500 deg. F., like that shown in Fig. 9, has been used satisfactorily. Dimples of 100 deg. can be made on J-1h material at 400 deg. F. at the rate of one dimple in 3 to 5 sec. without much difficulty. Cracking on dimpled sheets sometimes occurs during the riveting operation, especially when using a vibrator, unless extreme care is used. Fig. 10 shows the good and bad applications of dimpled skin.

Riveted magnesium J-1h sheets were tested to determine their fatigue endurance taking into account the effect of several variables.

Two methods of driving the rivets were employed, namely, squeezing and vibrating. It was found that the method of driving the rivet has no appreciable effect in the fatigue endurance of the riveted joint. Other




ABOVE

FIG. 10—Showing permissible and poor applications of dimpled skin.

A—Dimpling of two light magnesium sheets is not recommended due to occasional cracking of the sheet nearest the upset head of the rivet.

B—Aluminum sheet next to the upset end of the rivet eliminates cracking, making this arrangement permissible.

C—Magnesium skin dimpled into a countersunk structural member of either magnesium or aluminum is considered very satisfactory.

D—As a good alternative to dimpled magnesium skin, a reinforcing magnesium strip of sufficient thickness may be fastened with metal adhesive to the skin, then countersunk.

o o o

conclusions reached from this investigation are as follows:

1. Round head rivet, countersunk head rivet in dimpled skin and countersunk head rivet in countersunk skin stand in the order named in their resistance to repeated loading.

2. An increase in sheet gage improves fatigue endurance more than an increase in rivet diameter.

3. Full size holes may be drilled prior to dimpling with no trouble.

4. Punched rivet holes are not detrimental.

# Springs of Case-Hardened Mild Steel

***. . . The author, A. M. Borzdika, reports in the Russian magazine Stal, No. 1-2, p. 42-44, on experiments conducted for substituting carburized mild steel for spring steel wire and strip. The method consists of deep penetration carburization at low temperatures. Particularly interesting is the use of fish scales, which proved to be a soft carburizing agent of great power of penetration.***

SINCE great difficulties were experienced in the supply of high carbon spring steel, the author suggested the use of plain low carbon stock for both helical and leaf springs with carburization after forming and followed by a standard heat treatment as it is applied to the standard high carbon stock with 0.7 to 0.9 per cent C.

The material produced in this manner cannot completely replace the usual cold drawn or patented spring wire (Russian standards NK, PK and R), but it possesses good resilience, approaching that of heat treated spring steel of Russian standards 75 and 85.

The steel used should comply with the usual requirements in respect to dimensional specifications, surface conditions, chemical purity and absence of inclusions. Sulphur should be below 0.045 per cent, phosphorous below 0.040 per cent, carbon between 0.08 and 0.25 per cent. But it is important to know the exact carbon content for the accurate adjustment of the cementation process.

In the development of this process the following problems presented the greatest difficulties:

(1) The heterogeneity of the carbon content over the cross-secton of the strip or wire after cementation.

(2) Surface cleanliness.

The first point is closely related to the service stress exerted on the springs. In spiral springs compressive and tensile resolve themselves into torsional forces. The torsional stresses exerted on spiral springs act most strongly on the surface and least on the center of the circular cross-section of the body. These stresses diminish in a linear function from the outside in. If the surface elements are exposed to a compression stress K, then at one-quarter radius from the surface the stress actually exerted is only three-quarters of K and at one-half radius it will be one-half K, etc., and at the axis the elements are unstressed and K is equal to 0.

This distribution of stresses allows the application of case-hardened springs. Assuming that the carbon content in the surface areas be 0.8 to 0.9 per cent, and the maximum permissible torsional stress be applied, which is 85,000 lb. sq. in. per for the standard heat treated steel 85 (Russian specification), then the stress distribution over the cross-section of the wire at various points is easily calculated. Therefore, the carbon content can be calculated which, for various points across the cross-section, corresponds to the torsional stress exerted. The heat treatment is analogous to the case of the high carbon spring. These data are given in Table I. The standard spiral springs for comparative data were made from a specially provided OST SI-322 spring steel (product of Russian steel 85) hardened in oil from 830 deg. to 850 deg. (1526 deg. to 1562 deg. F.) and tempered at 375 deg. to 400 deg. C. (707 deg. to 752 deg. F.) Data in Table I also apply to flat springs.

In the manufacture of springs by this method it is important that the carbon content be high at the surface where maximum stresses occur and diminish gradually to the inside where the stresses are small and thus correspond to the results shown in Table I.

## Technological Process

The following operations are necessary to manufacture flat and spiral springs by the new process:

(1) Pickling of the original material.
(2) Degreasing and neutralizing.
(3) Forming the springs.
(4) Case hardening.
(5) Hardening.
(6) Tempering.

The wire or the strip is pickled only if the surface is contaminated. The process steps of pickling, degreasing and neutralizing do not differ from the usual processes employed in the production of wire and strip. After these treatments the dimensional conditions of the spring stock should be met.

The springs are formed in the usual manner by winding the helical springs from wire and by drop forging the leaf springs from strip. Should the cleaning operations present any difficulty prior to the forming because of bulk, etc. then the order of operations may be reversed and the spring or spring parts (in the case of the laminated spring) can be formed first, and pickled and degreased afterwards.

## Cementation

The cementation process for making springs should effect the following:

(1) The cementation should be of great depth of penetration (that is the residual low-carbon core should not exceed one-tenth of the diameter or thickness of the stock).

(2) The gradient of carbon content from the outside to the center should correspond to the conditions set forth in Table I.

(3) The carbon content in the peripheral areas should be between 0.8 and 0.9 per cent C.

(4) The structure should not be of a coarse grain.

(5) The surface of the springs should be clean.

The above conditions are best achieved by gas carburization. Since no gas carburizing equipment was available to the author, the experiments were carried out by means of solid case-hardening agents. Twelve different reagent mixtures were tried out and used on 40 different experimental runs. The wires and sheets used had the following diameters or thicknesses: 0.5, 0.8, 1.0, 1.5, 2.0, 2.5, 3.0 mm. (0.02, 0.032, 0.04, 0.06, 0.08, 0.10, 0.12 in.) The results of the best runs are shown in Table II.

When using material of 1.5 mm. (0.06 in.) thickness the carburization temperature should not exceed 860 deg. C. (1580 deg. F.) for best results. Higher temperatures result in a coarse grain structure, combined with the appearance of a cementation network and surface deterioration. Furthermore, soda admixtures to the charcoal should be reduced. This condition insures a favorable carbon gradient from the surface into the core of the carburized material.

If the conditions as outlined are adhered to, especially in the manufacture of very thin springs, constant results can be expected and a surface carbon content of 0.8 to 0.9 will result.

With increasing thickness of the material the carbon content gradient becomes steeper, that is, the difference between surface and core carbon content becomes accentuated. If the diameter is 1.5 mm. (0.06 in.) or the thickness (in the case of a flat spring) 1.2 mm. (0.05 in.), then the limits of the gradient can be seen in Table I.

However, for greater thicknesses the required deep penetration of the case cannot be achieved either by using charcoal and soda, as practiced, nor with any of the other solid carburizing agents used at present. The reason for this difficulty is inherent in the formation of a cementation network in the peripheral zone. Therefore, the author tried out such rare organic carburizing agents as powdered crab shells and fish scales. Although the powdered crab shells showed certain advantages over the charcoal and 5 per cent soda mixture, the results achieved were not wholly satisfactory for the carburization of wire thicker than 1.8 mm. (0.072 in.) diameter and sheet above 1.5 mm. (0.06 in.) Experiments with fish scales verified the results of V. Shumkin and A. Savkin (Vestnik Dalneyvostochnogo Filiala, AH, USSR, 1937, No. 26, p. 71), which showed this substance to be a soft carburizing agent of great power of penetration. It produces a flat gradient of carbon content decrease towards the core of the steel and a constant carbon content of 0.8 per cent in the surface. Using this carburizing agent cylindrical springs up to 3 mm. (0.12 in.) diameter and flat springs up to 2.5 mm. (0.10 in.) thickness were treated successfully. See Table II.

**TABLE I**

**Permissible Carbon Content in a Cross-Section of Carburized Springs**

| Distance in R From Periphery | Permissible Torsional Stress, Lb. Per Sq. In. | Per Cent C in Steel | Maximum Hardness of Steel in Torsion, Lb. Per Sq. In. | Remarks |
|---|---|---|---|---|
| Surface | 86,000 | 0.8 to 0.9 | 86,000–100,000 | For Spiral Springs |
| 1/4R | 64,000 | 0.6 | 68,500– 77,000 | |
| 1/2R | 43,000 | 0.4 | 51,500– 57,000 | |
| 3/4R | 21,500 | 0.25 | 21,500– 28,500 | |
| R | ..... | .... | ..... | |

| Distance From Surface, In. | Permissible Bending Stress, Lb. Per Sq. In. | Per Cent C in Steel | Maximum Hardness of Steel in Bending, Lb. Per Sq. In. | Remarks |
|---|---|---|---|---|
| 0 | 114,000 | 0.8 to 0.9 | 114,000–128,000 | For Flat Springs |
| 1/8 | 86,000 | 0.6 | 86,000– 92,500 | |
| 1/4 | 57,000 | 0.4 | 57,000– 68,500 | |
| 3/8 | 28,500 | 0.25 | 28,500– 35,500 | |
| 1/2 | ..... | .... | ..... | |

For still heavier sections gas carburization must be applied and the usual gas mixtures should be used, the most successful being $CO_2$ with a small admixture of volatile hydrocarbons.

## Final Treatment

The final treatment of the carburized springs consists of normalizing, hardening and tempering.

Normalizing of the carburized material is optional. If the normalizing step is applied, the strip or wire should be heated in a salt bath at 800 deg. to 830 deg C. (1472 deg. to 1526 deg. F.) for 3 to 5 min. and then cooled in air.

Heating to the hardening temperature should also be carried out in a salt bath to prevent surface oxidation and decarburization. For such a treatment any salt is suitable, the melting point of which is not lower than 500 deg. C. (932 deg. F.), and not higher than 700 deg. C. (1292 deg. F.) The author used a salt bath consisting of 56 per cent KC1 and 44 per cent NaC1 or 50 per cent NaC1 and 50 per cent $K_2CO_3$.

The hardening temperature used was somewhat higher, 820 deg. to 840 deg. C., (1508 deg. to 1544 deg. F.) because in the carburized spring the carbon content diminishes from the peripheral zone (0.85 to 0.90 per cent C) towards the center. Double hardening of the cemented parts was unnecessary since the carburized springs no longer gave evidence of the low carbon core (as said above, the original uncarburized core was no larger than one-eighth to one-tenth of the diameter or thickness), and also because the process of cementation takes place at temperatures where no grain growth will occur in the low carbon zone.

The quench is carried out in vegetable oils, such as linseed oil at 40 deg. to 50 deg. C. (104 deg. to 122 deg. F.) In some cases the quenching of springs is permissible in hot water (70 deg. to 75 deg. C.) (158 deg. to 167 deg. F.)

Tempering of springs of steel 85 (Russian specification) should take place at a suitable temperature between 360 deg. and 450 deg. C. (680 deg. to 842 deg. F.) depending on the required hardness. At the lower tempering temperature the Rockwell C hardness is between 19 and 15, at the higher temperature it is equal to $R_c$ 40. The surface hardness of the carburized springs corresponds to that of the ordinary springs. But experience has shown that these new springs must be tempered at temperatures from 30 deg. to 50 deg. C. (54 deg. to 90 deg. F.) lower than those made from ordinary spring steel. It is advisable to carry out the tempering in a potassium nitrate (saltpeter bath for 20 to 40 min. Cooling of the springs takes place in hot

**TABLE II**

**Optimum Conditions for Deep Penetration Carburization of Springs**

| Type of Spring | Diameter or Thickness, In. | Carburizing Agents | Carburizing Temperature, Deg. F. | Time in Hours |
|---|---|---|---|---|
| Flat | 0.02 | Charcoal + 5 Per Cent Soda | 1517 to 1544 | 1.25 to 1.5 |
| | 0.032 | Charcoal + 5 Per Cent Soda | 1517 to 1544 | 1.5 to 2.0 |
| | 0.04 | Charcoal + 5 Per Cent Soda | 1562 to 1580 | 2.0 to 2.5 |
| | 0.04 | Crab Shell | 1517 to 1544 | ≃ 2.0 |
| | 0.06 | Crab Shell | 1562 to 1580 | ≃ 2.0 |
| | 0.06 | Fish Scale | 1580 to 1616 | 2.5 |
| | 0.08 | Fish Scale | 1580 to 1616 | ≃ 4.0 |
| | 0.10 | Fish Scale | 1580 to 1616 | ≃ 6.0 |
| Spiral | 0.032 | Charcoal + 5 Per Cent Soda | 1517 to 1544 | 1.5 to 2.0 |
| | 0.04 | Charcoal + 5 Per Cent Soda | 1562 to 1580 | 1.5 to 2.0 |
| | 0.06 | Charcoal + 5 Per Cent Soda | 1562 to 1580 | 2.0 to 2.5 |
| | 0.06 | Crab Shell | 1562 to 1580 | ≃ 1.5 |
| | 0.08 | Fish Scale | 1580 to 1616 | ≃ 3.0 |
| | 0.10 | Fish Scale | 1580 to 1616 | ≃ 5.0 |
| | 0.12 | Fish Scale | 1580 to 1616 | ≃ 8.0 |

water 60 deg. to 70 deg. C. (140 deg. to 158 deg. F.) in which the springs are cleaned from the adhering salt. In order to prevent irregularities in the heat treatment (especially of the spiral springs), it should be carried out on racks.

### Conclusions

The author has shown how to substitute carburized mild steel for spring steel wire of 0.8 to 3.0 mm. (0.05 in. to 0.12 in.) diameter and strip from 0.5 to 2.5 mm. (0.02 to 0.10 in.) thickness up to 300 mm. (12 in.) length. The method consists in deep penetration carburization of low carbon steel wire and strip at a low temperature 825 deg. to 860 deg. C., (1517 deg. to 1580 deg. F.) as shown in the following table.

| Carburizing Agents | Maximum Diameter of Wire, In. | Maximum Thickness of Strip, In. |
|---|---|---|
| Charcoal and 5 per cent soda | 0.06 | 0.05 |
| Crab shells | 0.072 | 0.06 |
| Fish scales | 0.12 | 0.10 |

The carburized springs are heat treated in this manner: Normalizing: Heating in a salt bath from 800 deg. to 830 deg. C. (1472 deg. to 1526 deg. F.) from 3 to 5 min., cooling in air.

Hardening: Heating in a salt bath from 820 deg. to 840 deg. C. ,1508 deg. to 1544 deg. F.) from 2 to 5 min., quenching in a vegetable oil at 40 deg. to 50 deg. C. (104 deg. to 122 deg. F.).

Tempering: Heating in potassium nitrate bath from 20 to 40 min. at 300 deg. to 420 deg. C. (572 deg. to 788 deg. F.) (depending on the required hardness). The above method was successfully applied in the production of several vitally needed springs.

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## *Drill Fixture for Structural Angles*

A NEW drill fixture, used for locating holes in structural angles up to 10 ft. in length, has been devised by R. K. Best at General Electric's Pittsfield Works. The fixture consists of a T-bar holding assembly, equipped with scales and indicators for quick and accurate indexing in both coordinate directions. It rides on rollers located in a channel, the side of which acts as a guide, and the fixture may be easily moved in a lengthwise direction manually. It is operated in a crosswise direction by means of a pair of worms operated by a handwheel located on the front of the base.

The piece to be drilled is held in place by a number of screw clamps. These clamps are provided on both sides of the T-bar, thus allowing both sides of the angles to be drilled without turning it end for end. Air clamps are provided to lock the entire assembly in position when properly set up at each indexing position.

Both longitudinal and lateral scales are directly in front of the operator in an easy-to-read position. A chart, furnished with each set of angles to be drilled, corresponds to the scale readings and shows the center position of the holes to be drilled.

This fixture and method of drilling is very satisfactory and much more successful than the conventional method. The operator no longer has to read blueprints to determine where the holes are to be drilled; guess work has been eliminated entirely, the setup is much faster, and the drilling is performed with much less handling.

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FIXTURE for drilling holes in structural angles under a radial drill. Longitudinal positioning is gaged by scale under hand clamps and the crosswise scale over the handwheel at right. Air clamp at left locks assembly in position.

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# Air Expanded Plastic Rivets

COMPRESSED air of but a few pounds pressure is used to expand a new type preheated hollow plastic rivet which can be used to attach fabric to metal, wood or plastic; and metal to plastic sheeting. This new type rivet resembles functionally the recently developed hollow metal rivet which acquires clinching force not by hammering it but by a bulge created by an internal explosive charge.

This addition to the plastic products family was recently developed by S. H. Phillips, process engineer, of the Douglas Aircraft Co., El Segundo, Cal. The development work by the engineers at the El Segundo plant in this novel method of attachment indicates that a wide application in civilian production is foreseen besides immediate applications in aircraft work.

In design, the rivet shank and head are not limited to specific shapes, Fig. 1, but provision must be made for center-boring the rivet through the head to provide a means for compressed air application during clinching. (See Fig. 2.) The center-bore which is carried to within a short distance from the bottom of the rivet, forms a pocket into which the compressed air is directed during driving. Just prior to driving, the rivet is heated to a predetermined temperature to soften the plastic. When it is inserted for driving, compressed air applied through the center-bored head causes the shank section to bulge (Fig. 2). This expanded section hardens immediately, clinching the rivet firmly in place. In Fig. 3 is shown the application of the blow gun to the heated rivet in place.

Development of the plastic rivet required careful selection for suitable material. Three fundamental characteristics of the plastic to be used were necessary: The plastic rivet would have to exhibit satisfactory impact and tensile strength, soften at temperatures low enough to permit han-

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RIGHT

FIG. 2 — Sectional view of an expanded plastic rivet showing bulging walls causing clinching of materials.

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ABOVE

FIG. 1—Plastic rivets before and after application of compressed air.

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FIG. 3—After the operator has placed the heated rivet in place, it is then expanded by an air gun as shown.

dling without special equipment, and have a coefficient of expansion low enough to prevent loosening of the rivet in the hole upon cooling. In addition, the plastic ought to be resistant to oil, gasoline, solvents and other chemicals common in aircraft operation, and more especially, possess a softening point of a sufficiently high range so that temperatures ordinarily met under service conditions will not impair their usefulness or practicability.

Several types of plastics were used in making the first rivets. Preliminary investigation eliminated some types and indicated favorable characteristics of others. Among the plastics investigated were acrylic, high temperature acrylic (Lucite HM-119), Ethocel Lt, Ethocel ER, cellulose acetate butyrate 204A-H2, 204A-H3, 204A-H4, 205A-H2, 205A-H3, and 205A-H4. Of these several materials, it was found that rivets made from acrylic developed satisfactory tensile strength, were easy to install, and gave uniform results. The acrylic plastics possess a characteristic that is very desirable in plastic rivet design, namely, "plastic memory" which is the ability of formed plastic to regain its original shape upon subsequent heating. Application of heat will cause the expanded end of the rivet to shrink to its original size, so that the rivet may be removed from the mounting hole without destroying and reused as desired.

Other plastics tested displayed a tendency to "cold flow" while under tensile strain. Instead of breaking, the expanded end of the rivet would compress and thereby allow it to slip out of the mounting hole. The cellulose acetate-butyrate rivets broke under tensile strain, but not before considerable cold flow had occurred.

The most surprising characteristic of plastic rivets was the strength exhibited after installation. In the mock-up test installations tough airplane fabric was riveted to a trussed aluminum rib using center-bored ¼ in. acrylic rivets. The test structure was in the form of an air-tight box so that internal air pressure could be used to blow the fabric away from the ribs. This would give some indication of the aerodynamical efficiency of airfoil surfaces attached in this manner. When air pressure was applied to the interior of the mock-up, failure was in the fabric. Calculations showed that a load of 49.3 lb. had accumulated on each rivet before the fabric failed. Subsequent tests with the rivet installed in a tensile jig gave an average breaking strain of 220 lb.

Test installations with electroplated plastic rivets were found to develop greater tensile strength, flexural strength, and dimensional stability than the unplated variety, and can be driven just as successfully. Crazing of the plated deposit occurs on the expanded end, but all visible portions of the rivet are entirely unaffected by the driving process.

The industrial applications of plastic rivets as attaching plastic to fabric, rubber to plastic, or plastic to metal are a few possibilities. Low cost, ease of installation, and the fact that the rivets may be installed when only the head is available during clinching are factors that will contribute substantially to their use. Because the acrylic type rivet can transmit light and can come in different colors possibilities for decorative purposes are also substantial.

## *Induction Heating of Propeller Blade Hubs*

A NEW induction heating arrangement to heat the hubs of propeller blades forged by Chevrolet at its Saginaw, Mich., aluminum forge plant has increased production measurably through improvement in handling conditions, decreased heat in the working area and more uniform temperature in the metal being worked.

To attach thrust bearings to the blade forgings in an upsetter, a reheating of the forging must be done. Previously, the blades were piled into a gas-fired recirculating furnace, with about a third of the blade inside, and about 20 blades in each of the six compartments of the furnace. To bring these blade hubs to a forging temperature of 800 deg. F. required 2½ hr.

In the new set-up, a five-station induction heater powered by a 200-kw. motor-generator set is used. The motor generator set is driven by a 310-hp., 440 volt, 60-cycle, motor, and the generator is a 200-kw., 3000-cycle unit with a 500-amp. rating at 400 volts. Constant voltage is maintained by a regulator regardless of number of stations in use.

Each blade is held in a small carriage with the hub end inserted about 8 in. into a water-cooled copper coil. The heating requires 3 min., 10 sec., with one blade ready for the upsetter every 47½ sec. To heat one blade, 45-50 kw. at 125 amp. and 360 volts is required.

CHEVROLET installation for induction heating of aircraft propeller blade hubs prior to upset forging. The upsetter may be seen in the left background.

# Cleaning Aircraft Parts

***. . . Procedures used in sand blasting, degreasing and alkaline cleaning are fully described in this article based on a survey of aircraft practice. Also discussed are economical plant installations and the limitations of each cleaning and precleaning method are considered.***

SAND blasting has been found particularly useful for the removal of heavy rust or scale left by welding or heat treating. Also, in such instances as the cleaning of tubular parts or assemblies, where the pickling process is unsatisfactory because of the possibility of entrapping acids, sand blasting may be satisfactorily substituted.

The actual blasting operation consists of blowing the grit through a nozzle by means of air pressure. The distance the nozzle is held from the surface to be cleaned, its angle relative to the surface, and the air pressure used vary with the work to be cleaned. The type of abrasive employed is also dependent upon the type of work and the specifications covering it.

The sand or garnet grit used in the aircraft industry is of such size that it passes through a No. 24 sieve and is retained on a No. 40. Steel grit, unless otherwise specified, must conform to Army Air Forces Specifications No. 14100, Size No. 50, but should not be used for blast cleaning corrosion-resistant parts or aluminum, magnesium or copper alloy parts.

Although sand blasting may be used in most cases, there are limitations which should be considered before subjecting a part to this cleaning method. Parts with close tolerances cannot be sand blasted without loss of dimension. In the case of parts fabricated from thin gage metals, hardness or brittleness may result due to cold working. If the air pressure is too high, thin castings undergoing this treatment may warp.

Sand blasting methods of application vary with the individual requirements and the type of equipment should be determined only after a careful analysis of materials, parts and production. Where exceptionally large parts and castings are to be cleaned a large blasting room is desirable. These rooms are loaded either by cars or turntables and the operator, protected by special clothing, works within the room. Other types of room cabinets are loaded by means of a turntable but the operator controls the sand blasting from the outside. For small parts, automatically operated sand blasting barrels are more efficient than cabinet type equipment.

In all installations and layouts the sand blast equipment should be installed in an area completely walled off from the rest of the shop or plant and adequately exhausted. All equipment should be individually exhausted. Periodic tests should be made in the sand blast room for the possibility of dust laden air and the danger of silicosis to the employees. All employees should wear protective masks.

## Degreasing

Degreasing is primarily a precleaning operation that removes grease and oils from metallic surfaces by either immersion into or condensation of hot solvent.

The principle on which a vapor degreaser operates is similar to that of a reflex condenser. It consists of a galvanized steel box-shaped apparatus with a heating chamber near the bottom and a vapor chamber toward the top. The top of the vapor chamber is provided with cooling coils or compartments to recondense the hot vapors, preventing the escape of the solvent.

The solvent, commonly in use by the aircraft companies in vapor degreasers, is trichlorethylene, distributed under such trade names as Blacosolv and Permachlor. The low boiling point of trichlorethylene, 188 deg F., makes it applicable to the degreasing of heat treated aluminum alloys without any ill effects to the alloy.

The work to be cleaned is lowered into the vapor chamber where the hot vapor condenses on the work and washes off the grease and oils. The parts should remain in the vapor chamber until the metal approaches the temperature of the vapor. Where heavy greases and insoluble particles are to be removed, the parts may be immersed in the boiling solvent followed by a wash in cool, clean solvent. Some types of degreasers have spray guns which may be used to wash the work with freshly distilled clean solvent.

It is important to note that parts must be free of water when placed in the degreaser. Parts containing water soluble oils would likewise never be placed in the degreaser as long as the oil is in a wet condition. If all the water content of the oil has been evaporated and the oil is in a dry state the parts may then be degreased. Water, coming in contact with the solvent, breaks down the trichlorethylene and causes a corrosive action on the parts.

For general purposes a degreaser operates most efficiently if the solvent is maintained at its boiling point.

Vapor degreasers should be installed in any department where there is need for production cleaning facilities and are particularly adaptable to machine shops, processing departments and cleaning prior to final finishes.

In the processing department, vapor degreasing is applicable as a precleaning operation to nearly all types of processing. The degreaser should be so located as to maintain a flow of parts from the degreaser to the various processing units. Where the degreaser is operated as a separate precleaning unit for the various

processes, it may be located at the beginning of the parts flow into the department so that transportation is cut to a minimum.

Wherever processing and production permits, the most efficient layout and installation is a conveyorized degreasing unit whereby the parts are carried by a conveyor through the degreaser and then directly to the processing units, thus maintaining a steady production flow through the degreaser and processing units with a minimum of handling and transportation.

In designing vapor degreasers, it is essential that sufficient heating capacity be provided. If not, the vapor line in the cleaner will drop too low when the cold work is immersed and seriously retard the cleaning process. Improper height of the vapor column and poor condensing facilities permit large solvent losses and lower the amount of heat which can be applied to the boiling solvent. The equipment should be designed as closely as possible for the required size and volume of work because too large units allow higher ratios of solvent loss by diffusion to the amount of work cleaned, and too small units will permit large solvent losses by displacement of vapor by the work when it is immersed.

**• • • This article is first of a series derived from the survey on "Process and Paint" conducted by the Lockheed Aircraft Corp. under the auspices of the Methods Improvement Panel of the Aircraft War Production Council, representing leading West Coast airframe companies. Three additional articles are scheduled for publication: "Stainless Steel and Magnesium Pickling," "Protective Coatings for Aircraft Parts," and "Plating Practices of the Aircraft Industry."**

## Alkaline Cleaning

In addition to the removal of grease and oils, alkaline cleaning also eliminates superficial surface impurities. The essential components of a good alkaline metal cleaner are a source of available alkali, a buffer to control the alkalinity and a soap. There are at present many approved commercial cleaners formulated specifically for various types of cleaning. After selecting a commercial cleaner its specific purpose must be strictly followed. For example, alkaline cleaning solutions for aluminum are made especially for that purpose and should never be used for other metals.

The concentration of alkaline cleaner depends on the material to be cleaned and the oil, grease and dirt accumulation to be removed. In general this concentration of cleaner is 6 to 8 oz. per gal. of water, although those of 2 to 12 oz. per gal. of water have been used.

Both agitated tank cleaning and electrolytic cleaning are being used in the aircraft industry. By passing a low voltage current through the alkaline solution, the gases liberated on the work greatly speed the cleaning action and provide a more chemically clean surface.

In hot tank cleaning the solution should be agitated and maintained at a temperature of 180 deg. F. or above. The high temperature guarantees complete saponification of the saponificable portion of the greases. Solutions maintained near boiling afford a rolling agitation that exercises a definite scouring effect. The agitation of the solution by means of air or steam jets helps to maintain the grease in an emulsified condition so that the danger of loosened oil resettling on the metal is minimized.

To assure clean parts from the cleaner tank, a row of hot water spray jets may be installed along the top edge of both sides of the tank. These jets are controlled by the operator by means of a valve so that as a load of parts are removed from the cleaner tank, the jets can be turned on, spraying the parts with clean hot water and washing off any soap or oil that may adhere. This system has been installed on alkaline cleaner tanks at the Lockheed Aircraft Corp. and has proved satisfactory in reducing solution adherence and drag-over into the clear water rinse tank.

Electrolytic cleaning is accomplished by passing a low voltage (6 to 12 volts) current through the alkaline solution. The material to be cleaned serves as one pole and steel electrodes, inserted in the steel tank, serve as the other pole. The work is suspended from rods, using hooks long enough to allow the work being cleaned to be immersed in the alkaline solution. When the negative connection is made to the work bars, the material is cleaned cathodically, and when a positive connection is made the work is cleaned anodically. Oxygen is evolved at the anode and hydrogen at the cathode. There is considerable question as to whether the work to be cleaned should be made the anode or the cathode. Both methods have been used satisfactorily. It has been the practice, in some cases, to equip the tank with a double throw switch so that the current can be reversed and the cleaning can be either anodic or cathodic. The usual current densities range from 10 to 100 amp. per sq. ft.

In electrolytic cleaning the tank should not be used as an electrode, as electrolysis may cause failure of the welds in the tank and current is dissipated uselessly. It has been found much more efficient to suspend nickel plated steel electrodes in the tank and as nickel does not deposit in an alkaline solution, the anodes will remain clean at all times. Separate electrodes, rather than one continuous sheet, are preferred in order to increase the effective amount of edges available for the current to enter the solution. Electrodes with pierced holes further increase the edge area.

After the parts have been removed from the alkaline cleaning solution, they should be thoroughly rinsed in a clean hot water rinse, maintained at a near boiling temperature. This high temperature is necessary so that the pores of the metal will be kept open to permit thorough removal of the cleaning compound in the entrapped emulsified oils.

Because an alkaline cleaning operation is specified in practically all processes, such a tank is usually installed in each processing unit. Where processes are combined in the same production line of tanks, such as anodizing and chromodizing, one alkaline cleaner is sufficient for both processes. This practice of multiple installations is due to the low cost of constructing an alkaline cleaner tank when included with a complete processing tank unit plus the fact that the cleaner tank may be operated as part of a complete processing unit, serviced by a single craneway or monorail without any additional handling of parts.

The alkaline cleaning tanks should be steel lined, heated by steam, gas or electric and containing solution agitation. The temperature of the solution should be thermostatically controlled and the tank should also contain an overflow drain.

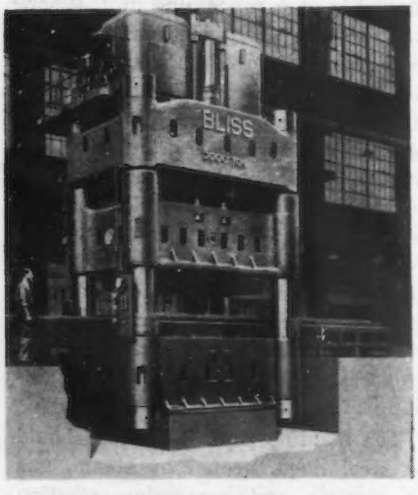
The rinse tank, following the alkaline cleaner, should be steel lined with heating units, overflow and agitation.

# New Equipment . . .

## Presses

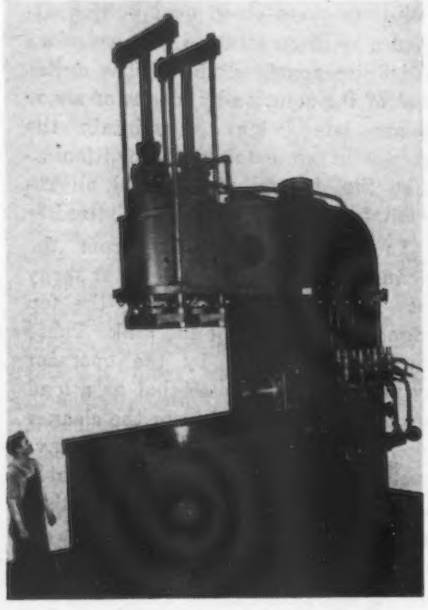
***. . . A wide variety of hydraulic presses, punches devices, bending machines and hand shears are described in the following pages.***

A 5000-ton two-die slide hydraulic press, said to be one of the largest and heaviest self-contained presses ever made, has been developed and built by *E. W. Bliss Co.*, 53rd Street and Second Avenue, Brooklyn 32. Having a maximum stroke of 40 in., the press incorporates the use of the rubber die process and the automatic die slide. Outstanding among the features of this press is the automatic cycle which causes the die slide to move into its position in 4½ sec., the stroke of the die slide being 168 1/16 in. As soon as the die slide is in position, the press completes a pressing cycle with pressure independently adjustable for each die slide. At the completion of the press cycle, the die slide automatically moves out into its loading and unloading position. Other features include universal electric control, interlocked safety sequence operation, independent pressure control on each die slide, provision for addition of third and fourth slide, shockless electric drive of the die slides and twin hydraulic pumping units and circuits.




### Hydraulic Flanging Press

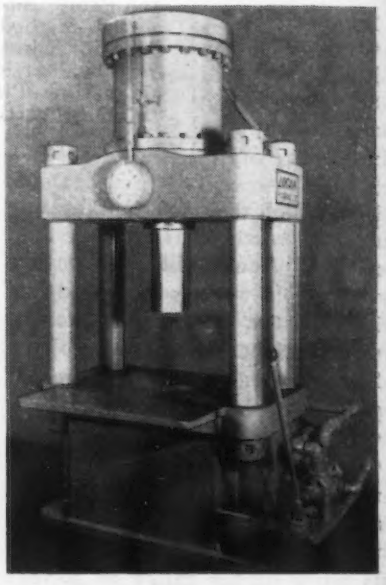
A HYDRAULIC sectional flanging press designed for 1500 lb. per sq. in. working pressure has been announced by *R. D. Wood Co.*, Philadelphia 5. Enclosed within the three piece heavy welded steel plate frame are two 10 in. tension columns which carry the full stress of the working load. There are two 16¾ in. diameter vertical main rams, a 14 in. stripper ram and a 15½ in. double acting horizontal ram. The travel of the main rams is 30 in. and each has a capacity of 150 ton. All operating valves are arranged in pulpit form



which will permit operating each of the two vertical main rams separately or both rams together. The stroke of both the horizontal ram and the stripper ram is 24 in. and the capacity 115 ton. Maximum daylight opening is 45 in.

### Rod Type Hydraulic Press

DESIGNED for heavy forcing and forming operations, a four-poster tie rod type hydraulic press with a maximum ram opening of 30 in. and a 15 in. stroke has been announced by *Logansport Machine Co., Inc.*, Logansport, Ind. A dual volume hydraulic pump provides low pressure operation during the non-forcing portion of the operating cycle and high pressure application during the actual forcing portion of the cycle. The changeover from one to the other is



accomplished automatically. A proportional pressure valve permits the gradual application of pressing force in any degree from zero to full capacity. A special platen extension is provided to facilitate loading and unloading.

### Small Hydraulic Press

A HYRAULIC press, suited for productions jobs in plastics, rubber, compreg wood and similar work and also for laboratory use for test or experimental purposes has been

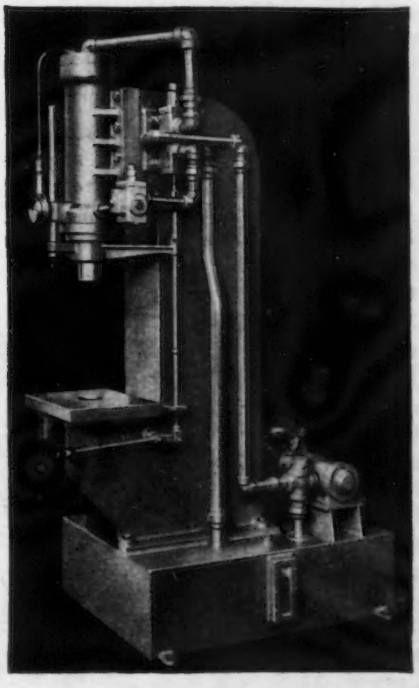
announced by *Charles E. Francis Co.*, Rushville, Ind. The press is built in four standard platen sizes, 12x12 in., 18x18 in., 24x24 in., and 30x30 in. Special sizes can be built to order. The presses are furnished without or with two or more electrically steam heated plates, with hand pump (single or double) motorized or pneumatic pumping unit, and with or without automatic pressure controls.


### General Purpose Presses

DESIGNED for assembly work, push broaching or pull broaching, a line of "Junior" hydraulic presses, in both bench and base types, has been announced by the *Colonial Broach Co.*, Detroit. The line comprises three tonnage capacities, 1, 2 and 4 ton. Two-unit construction is used in the pedestal type which is made up of the bench type press, illustrated, bolted to a reinforced base. Platens are counterbored concentric with the ram, permitting ready installation and locating of fixtures in line with the ram movement on the machine. The base below the platen is slotted and relieved to permit ready use of the press for assembly work. Ample daylight and stroke is provided. To furnish power for the hydraulic operating mechanism, direct-drive electric motors are vertically mounted in the column of the machine. For broaching, the pedestal type presses are available with a large coolant reservoir. A centrifugal type coolant pump is externally mounted on the rear of the base. For pull broaching operations, the platen is bored and provided with long guide bushings. Normal ram speed of the machine is 30 ft. per min. (15 ft. per min. on the 4 ton type). Speed is adjustable with an accessory control to any value below this. Other features include a variable pressure control and a pressure gage. Dual controls are also available.

### Hydraulic Gap Press

A 15 TON gap type hydraulic press with a maximum stroke of 15 in. has been announced by *Beatty Machine & Mfg. Co.*, Hammond, Ind. Originally designed for high speed broaching of small bronze bushings, the machine can be used for straightening and for the removal and insertion of bronze bushings and other bearings. The table is provided with 4 in. diameter clearance hole for the insertion or removal of press parts, broaching or bushing tools. This type press is built in capacities from 5 to 350 ton.



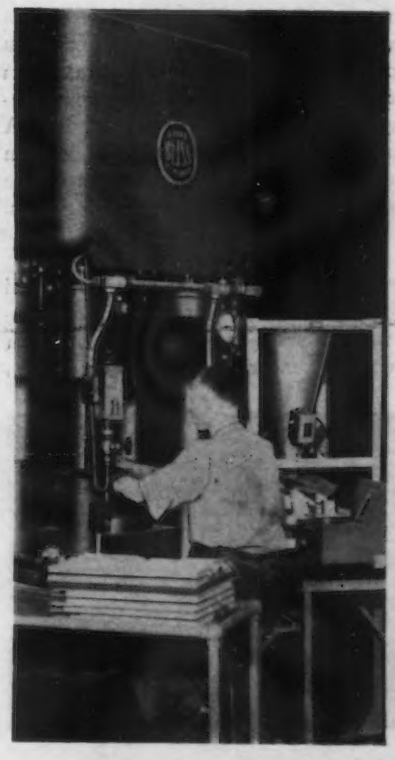
### Hydrostatic Test Press

A HYDROSTATIC test press for the determination of the strength of materials, design, etc., has been announced by the *Denison Engineering Co.*, Columbus, Ohio. Coatings for metals such as paints, enamels and plastics can be tested by alternate applications of pressure, simulating expansion and contraction. External pressure can be employed to determine the strength of all types of containers. Rapid porosity and seepage values are obtained through uniform application of pressure. Impregnation of aluminum-magnesium alloys by boiling or soaking in liquid can also be accomplished effectively with

the test press. The clamping portion makes it possible to test articles of various heights without retooling.

### Powdered Metals Press

A 200 TON hydraulic press for the compression of powdered metals has been announced by *E. W. Bliss Co.*, 53rd Street and Second Avenue, Brooklyn. The press is shown making a magnet pole out of iron powder. It is provided with a fully automatic cycle. Pressure and speed are both adjustable over a wide range. Similar presses are available in capacities to 5000 ton in this model as well as a



duplex model permitting pressing of deep molds from both ends to secure uniform density. The lower slide is used as an ejector. These presses are available with or without a center core rod. The duplex presses have independent speed, pressure and stroke control in each slide. Presses of multislide construction for special shapes such as wide flanged or webbed bushings are also available with independent pressure, stroke, speed and dwell control for each of the several slides.

### Special Hydraulic Press

A HYDRAULICALLY actuated horizontal forming press with safety dual push button control has been announced by the *John S. Barnes Corp.*, 301 South Water Street, Rockford, Ill. Two station push buttons mounted centrally on the face of the machine and spaced 24 in. apart control the advance and return motions of the ram. Hydraulic fluid moves the ram forward at the rate of 45 in. per min. and returns it with a speed of 90 in. per min. Maximum pressure of the hydraulic system during forming is 800 lb. per sq. in. A flange mounted dial pressure gage on the front of the machine indicates the tonnage exerted by the forming ram.

### Hole Punching Device

DESIGNED to punch an unlimited number of straight line, scattered and staggered hole patterns with varying center-to-center distances,

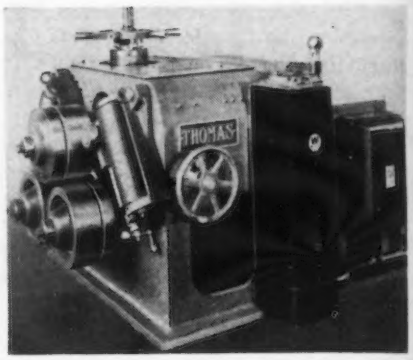
Wales Type BC hole punching units have been announced by *Wales Strippit Corp.*, 345 Payne Avenue, North Tonawanda, N. Y. Square sheared and curved sheets and long strips of flat material can be perforated with these units. A group of these units can be used interchangeably in press brakes and stamping presses by mounting on T-slotted plates, templates and rails. By using two Wales T-slotted plates and two groups of Type BC units, it is possible to have one pattern operating in press while another pattern is being set up on the second plate. These BC units are made up of punches, dies and stripping guide assemblies which are held together by holders as independent self-contained units. The punch is full-floating and may be instantly lifted out of the stripping guide assembly. Various diameter holes up to 5/16 in. in diameter can be punched with the same unit by changing the punch, die and stripping guide assembly. Throat depths are 4, 7 and 9 in.

### Hydraulic Accumulator

A HYDRAULIC accumulator designed for portable and stationary equipment has been announced by *Greer Products Corp.*, 39 West 60 Street, New York. The accumulator consists simply of a one-piece seamless steel shell without welds or joints, containing a completely enclosed one-piece synthetic rubber bladder having an integrally molded air valve. It is available for operating pressures up to 3000 lb. per sq. in. in capacities of 0.333, 1, 2½, 50 and 25 gal. For installation the accumulator merely requires a support or wall bracket sufficient to support its own small weight.

### Bending Rolls

A REDESIGNED line of bending rolls, built of welded steel plate and capable of rolling angles, tees, flats, rounds, squares, beams, channels and special shapes of almost unlimited variety, has been announced by *Thomas Machine Mfg. Co.*, Pittsburgh. The machines are available in four sizes, comprising rolls for bending angles 2x2 in., 3x3 in. and 4x4 in. in the vertical type and for bending angles up to 6x6 in. in the horizontal



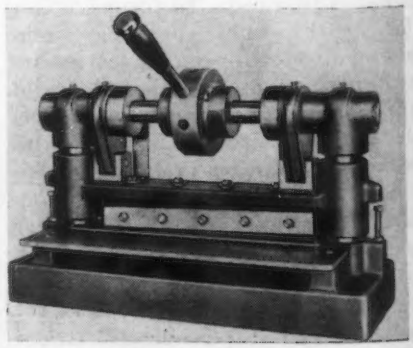

type. A feature of the machine is an adjustable auxiliary roller which counteracts twisting and keeps the leg of the angle square when rolled leg-in. When angles are rolled leg-out, this roller serves as a gage to indicate when the proper diameter is rolled. It can also be used for enlarging circles which have been rolled too small.

### Tangent Bender

AN improved tangent bender, with a 10 in. stroke, specially designed to edge bend sheet metal in the lighter gages has been announced by *Struthers Wells Corp.*, Titusville, Pa. Tangent bends in many forms can be bent cold in one operation. The metal is smoothly upset so that no further finishing is required. The tangent bender can also be used as a horizontal 50 ton press for blanking, piercing, forming, embossing and many other operations.

### Shears

FOR shearing and blanking out heavier parts and pieces to die shapes, *O'Neil-Irwin Mfg. Co.*, Minneapolis 15, has announced a larger size Di-Acro shear, the No. 3. The shear blades, of heavy tool steel, are reversible. A precision adjustment accurately stops blade travel which permits the shears to be arranged for a large variety of splitting and notching operations to extremely close tolerances. Accuracy is guaranteed to a tolerance of 0.001 in. in all duplicated work. Maximum shearing width is 12 in.; capacity 18 gage steel at full width.



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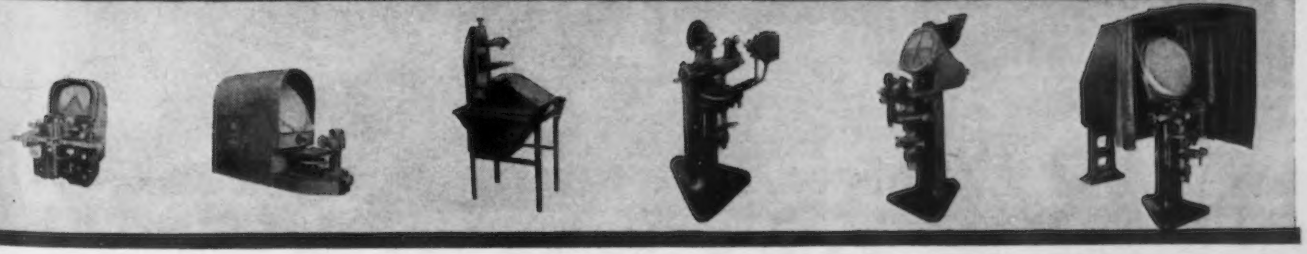


# Assembly Line . . .

STANLEY H. BRAMS

**• Detroit figures that if Germany collapses in near term new cars will roll from assembly lines by next spring . . . WPB meeting clears the road for reconversion.**

DETROIT—"Cars by next spring." That's the optimistic anticipation being passed around this center of automotive fact and fancy in the wake of the July 14 meeting of the company presidents with the War Production Board in Washington.

The anticipation that cars will be coming off assembly lines next March, plus or minus a month, is obviously based on a good deal of wishful thinking, but last week's upheavals in Germany seem to lend credence to the wishfulness. If cars are to appear next spring they must be preceded, sometime before early winter, by an end to hostilities in Europe, this being the largest barrier on the reconversion road.

But the auto people definitely expect the European phase of the war to end before the end of the year, perhaps before Election, even possibly before Labor Day. When it does, the go-ahead for reconversion will be given by WPB almost automatically. And the ground rules for the changeover have been set up at the July 14 meeting and the April conference which preceded it. In the files is a fairly well-defined procedure, practically complete as to policy except for the exact determination of initial quotas, and in shape for detailing.

Most important from the automotive standpoint was the setting up of procedure on acquisition of machine tools for reconversion. Aggregate requirements of the auto men were for about 8000 tools, and purchase of these will start as soon as the enabling order is issued on July 29. With backlogs thinned down to prewar levels in large numbers of machine tool companies, it is not expected that any great difficulty will be encountered in procuring required machines, even though the orders go in without priorities. Furthermore, WPB assured the auto men that if they were unable to secure any bottleneck tooling items, they would be furnished with preference ratings which would guarantee their completion along with the others.

By and large, the formula for purchase of surplus machine tools appeared to meet with acceptance in the automotive community. One modest exception may be noted to this, in the regulation providing that tools within the plant of a purchaser will cost 5 per cent more than if sold to an outside company, thereby compensating for lessened inspection, freight, etc. The story is that when this rule was read, one of the auto presidents at the meeting turned to another and said, "Well, we can take care of that one. You buy my tools and I'll buy yours."

Purchasing of DPC tools and equipment may be somewhat larger than was anticipated earlier, because recent machine ordering has been somewhat in the concept of combined operations—a tool usable for war work now and civilian work tomorrow. One company's plating baths, to furnish a pat example, are about 25 per cent larger than they need to be to fill their war work schedules. The size of the layout, however, is just about what this plant needs for its peacetime work. Original costs on equipment of this sort naturally ran higher than would have been the case had no leeway been permitted, but DPC resale prices will also be higher, and industrial scrappage will be reduced.

THE matter of production quotas is not quite the immediate reconversion problem that tooling is. Although no final decisions were reached at Washington, there is little indication of worry in Detroit over the situation, because the general viewpoint is that when the war with Germany ends materials and facilities will be so plentiful that quotas large enough to take care of everyone's minimum expectations will be available for the asking.

The War Production Board, tallying the "practical minimum" figures submitted by each manufacturer in advance, and gaging these against its own ideas of logical production volume, came up with a total of approximately 2,151,000 vehicles as an allowance for the first year of production. This total would be split into quarterly apportionments, and at this point the discussion did not progress further. The auto men evidently were

JEEP IN CIVVIES: *This remodeled jeep at Camp Gruber, Okla., bears some resemblance to the open touring jobs of the early 1920s. The hood extension in front of the radiator seems to be a take-off on the painted insignia of the famous Flying Tigers of Gen. Chennault in China.*

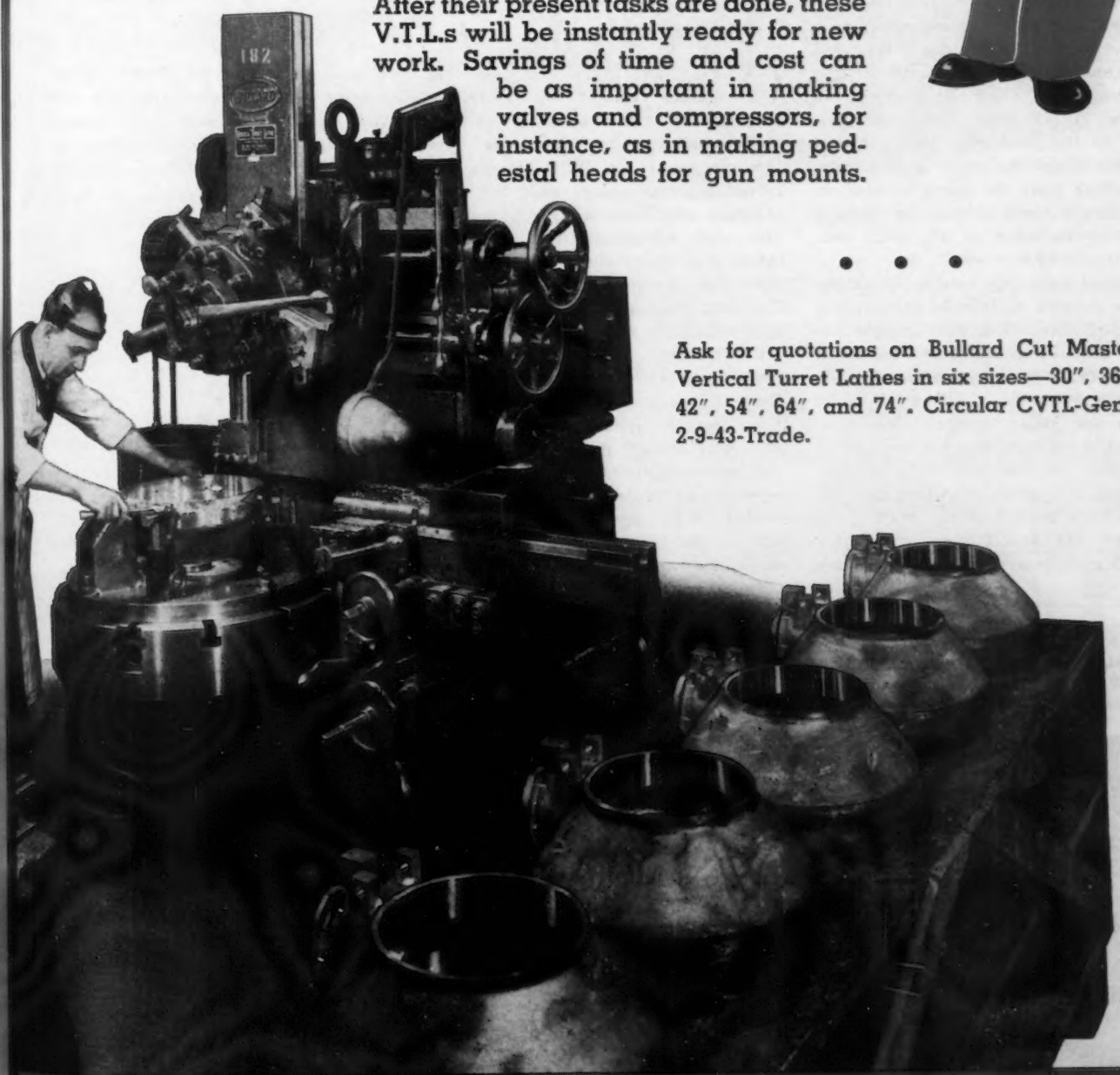
# Parts FOR WAR TODAY - For Peace Tomorrow


Hundreds of Vertical Turret Lathes like this one are helping to bring nearer the end of the war—by producing parts for the tools of war IN LESS TIME than outdated methods. For the Bullard with its two heads saves time on cuts and between cuts.

After their present tasks are done, these V.T.L.s will be instantly ready for new work. Savings of time and cost can be as important in making valves and compressors, for instance, as in making pedestal heads for gun mounts.

• • •

Ask for quotations on Bullard Cut Master Vertical Turret Lathes in six sizes—30", 36", 42", 54", 64", and 74". Circular CVTL-Gen.-2-9-43-Trade.



## The Bullard Company

BRIDGEPORT 2, CONNECTICUT

disinterested in splitting the aggregate figure into a series of quarterly totals which likely would start in rather low ground, and so the matter was held in abeyance. It is a fact, however, that the overall totals met no objections except from Willys, which argued that its anticipations were so large that its proportion was entirely out of line. It should be mentioned in this connection, too, that Crosley was apportioned some 6000 vehicles, which is probably more than that manufacturer produced in its entire semi-experimental program of manufacturing before the war.

Quotas handed to General Motors, Ford and Chrysler appear to have been somewhat under 50 per cent of a normal good year's volume by those makers, and were not further broken down. Each of these three concerns will apparently make its own decision on breaking down its aggregate among its various divisions. This leads to the possibility that some of the less salable makes of each of these companies may be manufactured in exceedingly small volume, or perhaps not manufactured at all, until production allowances swell.

Control over this volume of output was a subject of definite controversy still unsettled. The auto people argued that their being limited to a unit quantity was regulation enough, that the necessity of filling CMP-like forms and going through other procurement red tape was unnecessary in the face of the assembly quotas. There is very good indication that the automotive branch of the WPB feels this way too, and it appears probable that higher policy within WPB may also swing around to this logical viewpoint.

## *Ford to Make Four Cylinder Model "A" Car*

**• • • Ford Motor Company officials confirmed reports last week end that the company will put a four cylinder model "A" type car in the postwar field. Selling price is aimed around $500. This car "of lower horsepower and smaller size than its prewar offerings" was referred to in that way in THE IRON AGE, July 6 in a discussion of forthcoming new models.**

ONE phase of reconversion mechanics which was definitely dropped by the wayside was the "junior priority," or "blue order" system proposed by WPB, which involved placing orders now for subcontract requirements on passenger cars and releasing them as manpower and materials permitted (THE IRON AGE, June 29, 1944, page 58). The auto companies maintained that parts ordering now was not feasible when quotas, markets, prices and product types were undetermined. They also pointed out that such a program would tighten up manpower while employment is heavy due to the war, and would eliminate work in the reconversion period when jobs will be needed. WPB agreed to forget this plan so far as the auto companies are concerned, but the board may bring it up later for other industry groups.

Quite a bit of discussion revolved around the steel available. While there is no doubt in automotive minds that plenty of steel capacity can be diverted to their civilian goods needs once Germany falls, there is not so much certainty as to what kind of steel it will be. Some of the auto men at the meeting pointed out that the mills are producing NE grades to the neglect of full alloy specifications, and that before these lean alloys can be used on motor cars, they must undergo considerable experimentation. WPB **is not yet ready** to authorize the steel mills to make full alloys in the traditional automotive series, and this problem remains to be ironed out. It does not appear to be a major one.

On this score, steel companies are advising the auto makers that curtailment of plate ordering, expected when Germany falls, will enable reconversion of the mills to sheet output in little more than a weekend. Some mills, too, have definitely advised purchasing agents that they will be able to furnish required quantities of deep-drawing sheet—a consideration which has been a worry to many of the auto people for some time. For that matter, deep-drawing sheet is now being furnished for military vehicles, and breakage is only slightly above peacetime proportions.

The automotive companies all very solemly denied at Washington that the order permitting pilot models would benefit them at this time, inasmuch as their engineering and development facilities are wholly engaged on war work. However, as was reported here July 6, experimental work of this sort is going on in Detroit today and is continuing in enlarging volume. "Rejection" of WPB authorization to experiment can be taken simply as evidence of the fact that in normal civilian production the automobile companies quite naturally want to keep their development affairs and progress to themselves.

Also involved in this reaction was the desire of the auto companies not to appear in the newspapers as eager to hop back into civilian output, thereby inferring neglect of war assignments. These competitive and public relations factors together make up the reason why the general interpretation of the Washington meeting was that it hemmed and hawed and generally stumbled.

**PLANE LAUNCHER GUN:** *At Canton, Ohio, a worker shoves a shell into a plane-launching catapult gun to test the breech during construction at the U. S. Naval Ordnance Plant operated by Westinghouse. When a shell is fired in the gun, gases start an operating mechanism which forces the plane into the air.*

KEEPING AHEAD OF THE TIMES

# MURCHEY

## *Now Offers*

## NEW AND IMPROVED TANGENT CHASER SELF OPENING DIE HEADS!

GREATER ACCURACY · LONGER LIFE

**TYPE "T-C"** is a rotating Die Head built to be used on any machine where the Die Head is revolved.

**TYPE "T-G"** is a non-rotating Die Head built to be used on machines where the Die Head does not revolve.

MANUFACTURED of Special Alloy Steel, hardened and ground throughout, these Die Heads (Model "T" series) are expressly made to cut accurate threads on long production runs. They are designed to use Tangent Chasers—giving long chaser life; permanent throat; uniformity of finished work throughout the entire life of chasers and interchangeability of chasers.

*Send for literature*

***Also ask for literature on Collapsible Machine Tap; Self Opening Die Heads; Thread Milling Machines; Tapping Machines and Roller Pipe Cutting-off Machines.***

**MURCHEY MACHINE & TOOL CO.**

**Department I**

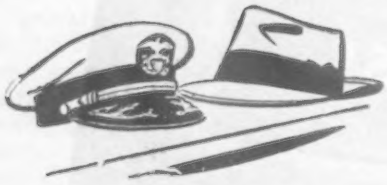
**DETROIT 26, MICHIGAN**

# MURCHEY

# Washington . . .

L. W. MOFFETT

**• Labor and management must exercise self-discipline . . . Unless mutual respect is attained, postwar industrial relations are headed for trouble.**



WASHINGTON — Unless labor and management exercise mutual self-discipline and reach a stage of mutual respect based upon the reasonableness of each other's needs and ideas, postwar industrial relations are headed for serious trouble.

As things stand now, it can be predicted without fear of contradiction that labor leaders will attempt to perpetuate the wage agreements dictated by the War Labor Board. It is equally clear that industry will resist.

It is expected that union leaders will attempt to continue wages at war rates, and at the same time seek a shorter work week, a prolongation of the closed shop, the check-off, and featherbed rules. Management can be expected to be equally determined that wages shall not be so high that they prohibit profits, nor will it agree to submit to what it considers labor's attempt to dictate its hiring policies, or to longer pay the cost of collecting union dues.

If no way is found around the obstacle of general disagreement, there will be strikes and lock-outs, and violence to persons and property. Markets will be disrupted; workers will lose wages and companies will lose income. The whole nation will seethe with hatred because people will take sides in the controversy.

For it seems that labor leaders of today cannot seek a wage increase without making socialistic arguments based upon the premise that the government has a duty to distribute wealth between capital and labor.

Though these ideas are accepted by the ignorant, the parlor pinks, the socialists and the communists, the ideas are repugnant to any American who has read history and is acquainted with the principles of American and English property law as it has developed over the last 500 years.

Congress has shown management, by enacting legislation, that it will not do for owners to try to oppress labor or pay starvation and sweat-shop wages. Of course, this legislation doesn't hit a majority of employers who are just as opposed as is Congress to oppression of labor. Citizens are convinced of the value of unions and public opinion will not countenance attempts to abolish collective bargaining and unions.

Though labor relations and wage contracts have been a matter of private or state control historically, the public interest involved in the forthcoming battle because of its magnitude will force the federal government to take cognizance of it and affirmatively establish for the first time the rights of management as well as those of labor.

In the final analysis the sense of fair play which is easily the most outstanding American characteristic will not stand for organized labor oppressing management any more than it will stand for the reverse. This means strict regulation and more bureaucrats, unless some compromise or more sympathetic understanding between the two is reached.

THE era of gangsterism in labor relations must go. The American people will not stand for the intimidation of workers, by either management or labor. Goon squads must be dissolved and private arsenals destroyed.

Union organizing "accidents" which some unions have found useful to further closed shop drives and other organizing drives, must be stopped and stiff penalties must be imposed on anyone found guilty of such an act. Labor unions must be made responsible for damage and nuisances committed upon owner's property by strikers.

If unions are granted the check-off, then they should pay the operators the cost of keeping books and an additional fair sum to offset the cost the union would normally incur in making collections.

The closed shop should be purely a matter of agreement between workers and the companies, and not a clumsy, coercive "yellow dog" instrument forced on management to secure the vote of labor to wage a presidential campaign.

Fair wages and most conditions of labor except those pertaining to safety devices and plant health standards should not be the subjects of legislation. Collective bargaining should be conducted with an eye to geographical differentials, purchasing power of the dollar, the cost of living, the rates for comparable jobs in other companies, etc.

Wherever an employer refused to pay a going rate, or tried to drive wages down to a level of the sweatshop, then legislation should confer the right upon unions or groups of workers, or individual employees to go to court to seek redress. If the employee group proved its case, then the court should conform to standards laid down in legislation and award reasonable retroactive pay as well as direct the future rate.

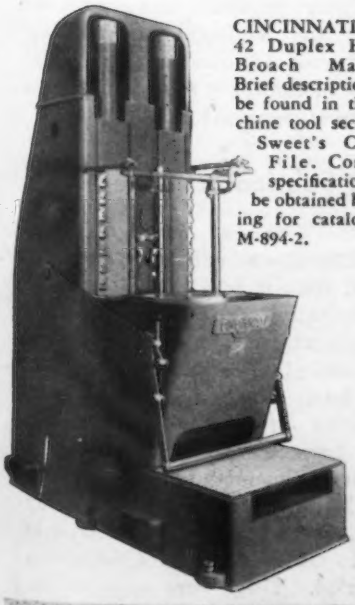
YOU'RE TOO LATE, MAC: *American humor is present, even in the midst of battle. While the Marines were still fighting for Garapan, principal city in Saipan, one thoughtful Leatherneck places this sign near a wrecked house on the outskirts of the town to give his buddies the scoop.*

# did you ever try

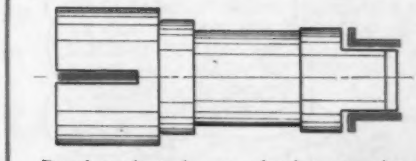

CINCINNATI

# BROACHING A NARROW SAW SLOT

## *at a rapid production basis?*



CINCINNATI No. 5-42 Duplex Hydro-Broach Machine. Brief description may be found in the machine tool section of Sweet's Catalog File. Complete specifications may be obtained by writing for catalog No. M-894-2.



Drawing of steel core, showing saw slot and two surfaces broached in right-hand station.

One of the most difficult operations on a surface broaching machine — that of broaching narrow saw slots — has been perfected by CINCINNATI Application Engineers to the point of a routine production job. An example of this type is illustrated here . . . a "broach-sawing" operation combined with the broaching of other surfaces. Suppose we consider the broach-saw operation alone:

The part, shown in the sketch, is a small steel core. A slot about 7/16" deep x 1/16" wide in one end of the part, and two flats on the other end of the part, are broached in the right-hand station of the machine, a CINCINNATI No. 3-48 Duplex Hydro-Broach.

A saw slot of these dimensions is truly an innovation in the field of broaching. Does it suggest a more economical method in your own shop? *Perhaps cutting off bar stock?* Our engineers will be glad to discuss this possibility with you, and to show you how CINCINNATI Hydro-Broach Machines will fit into your production lines.

**THE CINCINNATI MILLING MACHINE CO.** CINCINNATI, 9 OHIO, U.S.A.

TOOL ROOM AND MANUFACTURING MILLING MACHINES . . . SURFACE BROACHING MACHINES . . . CUTTER SHARPENING MACHINES

# OPA Announces Changes In Iron and Steel Price Resale Setup

*Washington*

• • • **Effective July 25,** OPA has announced minor changes in the price schedule governing the resale of iron or steel products that either reflect industry practice or clarify existing provisions.

A number of items were added to various price tables to correct inadvertent omissions from the schedule. For example, the pickling extras heretofore set forth an Appendix C for other bars now apply to hot rolled alloy bars. An extra of 25c. was added for beveled edge sections of hot rolled carbon bar flats, square and round edge. New size designations were added to the size extra tables in all zones for channels and half ovals.

Certain changes were made in previously-established extras. Among these is one extending the tables fixing extras for pickling in zones 1, 2, 3 and 4 to provide an extra in cases in which hot rolled sheets and bars, plates and hot rolled strip have been job or warehoused pickled. This extra was already in effect for all other zones and is in accordance with industry practice.

Typical of the changes made for purposes of clarification was the rewriting of the freight tables in zones 5, 11 and 17 so as to clarify the application of the maximum freight absorption provisions. Descriptions of the Omaha, Duluth-Superior and St. Paul-Minneapolis free delivery areas have been added in order to facilitate the determination of maximum prices in those regions.

•

## WPB Eases Situation On Aluminum and Magnesium

*Washington*

• • • **The WPB Conservation** Division last Thursday announced that it had shifted the position of aluminum and magnesium from Group II, the list of materials currently in balance between supply and demand, to Group III, the materials that exceed current war and essential needs. This was the outstanding feature of Issue No. 13 of the Materials Substitution and Supply list released by the division.

Howard Coonley, division director, said that the supply of many fabricated and semi-fabricated metal products continues to be tighter than the metals themselves because of the scarcities of manpower or facilities.

"Among ferrous items in limited supply are malleable iron castings, small and medium steel castings, automotive-type gray iron castings, forgings, flat-rolled steel products, cold-drawn seamless tubing, rails and wire rope, quality carbon bars and forging billets," said Mr. Coonley.

Non-ferrous shortages are in copper base alloy rod, bar, wire, tubing over 4 in. and condenser tubing, all insulated copper wire, cable and cords (other than weatherproof wire and cable). Similar shortages are found in tungsten and molybdenum rod, wire and sheet and to some extent in aluminum foil.

•

## Require 1,175,000 Tons Of Steel for Service Programs

*Washington*

• • • **The step-up** of half a dozen programs in the fourth quarter by the Army and Navy means that WPB will have to find an additional 1,175,000 tons of steel over second quarter requirements.

The programs are: Heavy ammunition, bridges, a special kind of bombs, other ammunition, engineering equipment and naval ordnance.

WPB officials say that this means something will have to be done to maintain and increase existing employment levels and other programs will have to be adjusted to give the Army and Navy what they have asked for. There is some anxiety about whether the industry can maintain present reduced operating rates in the face of continued draft withdrawal and normal turnover.

•

## To Set Fabricators Prices

*Washington*

• • • **Effective recently,** OPA has announced that it will establish prices for fabricators and sellers of fabricated structural shapes and fabricated steel plates and bars who were not in business during March, 1942, the basing pricing period provided by the present regulation for sellers who were in business at that time.

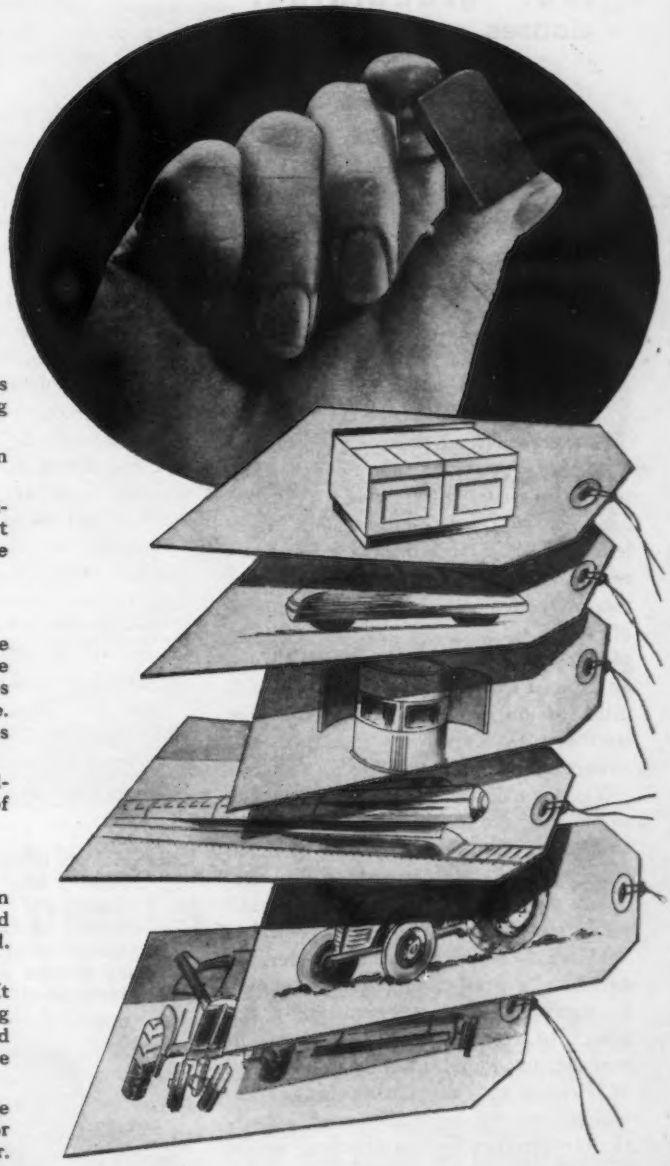
Fabricators and sellers affected by the announcement were authorized to apply to OPA for a price determining period. They were required to give a full description of the commodities, structures or services he intends to sell and a proposed determining method resulting in maximum prices in line with other orders.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

# The Hardest *Metal* Made by Man

## may write the price tags of tomorrow

**Starting as a metal powder, Carboloy Cemented Carbide is transformed, under heat and pressure, into an endless variety of shapes and forms—tool tips, dies and machine parts with the *super-hardness* that is vital to high-speed, low-cost industrial production.**



IT TOOK a war production crisis to bring this magic metal into its own — to bring full appreciation of its value for metal-working tools and for "wear-proofing" parts.

The cold, hard figuring of comparative manufacturing costs soon will prove its full value in peacetime manufacture.

It is safe to say that Carboloy Cemented Carbide has revolutionized the thinking of industrial engineers and production men — not only as to materials and product design, but as to *tool performance and cost of manufacture.*

***It started U. S. tanks rolling***

An example! Without carbide tools the machining of armor plate for U. S. tanks would have been virtually impossible at the rate the emergency demanded. More than that, cemented carbides *saved millions of dollars and millions of manhours in manufacture.* As one noted authority recently said, "Today the tungsten carbides . . . perform miracles . . ."

We are in a new age of harder, tougher alloys — of special-purpose machinery — of longer life for products and parts — of closer tolerances combined with mass production.

***For the coming "battle of costs"***

Tomorrow's uses for Carboloy Cemented Carbide are widespread in many fields. Machining all types of hard and soft metals and plastics. Drawing wire and tubing. Drawing and forming sheet metal. "Wear-proofing" parts.

It has the *super-hardness* needed to handle modern metals. It works at speeds once thought impossibly high. It slashes machining costs — commonly doubles or triples the output of men and machines. It may well write the price tags in the coming "battle of costs."

Manufacturers in every field are invited to take full advantage of Carboloy engineering, experience and facilities in planning for the race to get better products to market, at lower cost, after the war.

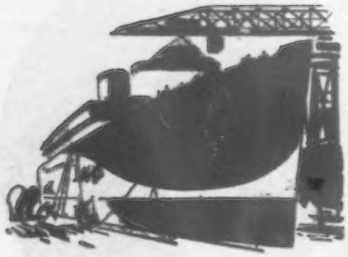
**CARBOLOY COMPANY, INC., DETROIT 32, MICHIGAN**

**CARBOLOY**
TRADE MARK

CEMENTED CARBIDE
**THE HARDEST METAL MADE BY MAN**

# WEST COAST . . . OSGOOD MURDOCK

**• How to have your cake in conversion when it first comes, and continue to eat rich war contracts too? . . . Airframe makers object to decentralization aims but other far westerners fear grandfather clauses.**



SAN FRANCISCO—When Under-Secretary of War Patterson recently advised the Senate Military Affairs sub-committee investigating war contract readjustment problems that the United States must decentralize airplane manufacturing and recommended continued maintenance of eight government-owned bomber plants located chiefly in the midwest, he poured a bit of water into the rich milk of only human aspirations in southern California to dominate the American aircraft industry postwar.

Yet a consistent following out of the same decentralization policy throughout heavy industry by the federal government in its conversion and disposal policies will favor the overall industrial future of the far West.

If what Maury Maverick refers to as the "grandfather clause" should be rigorously and conscientiously followed to freeze business to what it was before Pearl Harbor or the fall of France so that plants in general which had not manufactured a particular product before the war would be closed or held in reserve, so far as federal and public policy govern, and if public contracts and surplus materials and public finance and relaxed regulations and various forms of public largesse should be distributed on the basis of prewar patterns, then most far western shipyards, steel plants, aluminum reduction, extrusion and foundry installations and magnesium producing units would of course return to that lethargy or non-existence which largely characterized far western industry prewar.

But Mr. Patterson, and Mr. Forrestal and Mr. Gates of the Navy would heartily agree, for they indicate they are planning big postwar appropriations for military and naval aircraft and they must be counting on primary operations and deliveries from or near the West Coast to serve the future military era of the Pacific.

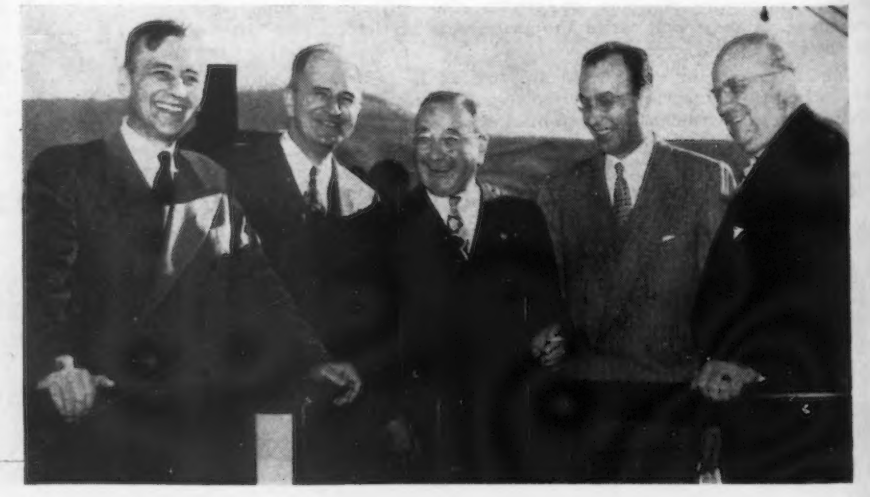
TO a considerable extent industrial contractors on the West Coast think it would be very nice to be able to keep on eating their cake while simultaneously the cake miraculously was changing into bread and cookies. Colonel H. E. Bullis, assistant chief of the Contract Termination Branch, Readjustment Division, Army Service Forces from Washington was one of the principal speakers at recent four-day contract termination training courses held at Los Angeles and San Francisco. He declared very frankly that war contractors on the West Coast would be the last to be terminated in the country owing to the war with Japan and that eastern manufacturers would start converting to peacetime production as fast as easing of pressure from European operations would permit.

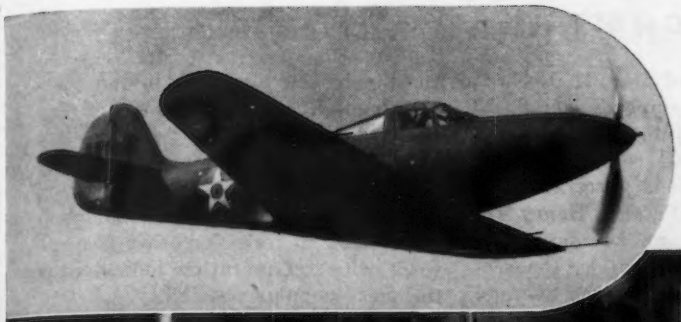
Over the past year or two, when labor, housing and facility shortages have moved contracts to distant areas or have prevented or discouraged renewals and additional contracts, manufacturers, Chambers of Commerce, labor leaders and municipalities on the West Coast have howled and squealed in agony. "Why build a beautiful big DPC foundry at Pittsburg, Cal.," asked these understandably ambitious industrialists, "and then don't permit the hiring of sufcient men or the offering of sufficient wages or the awarding of sufficient contracts to keep it more than a quarter or half busy?"

Now the shoe begins to pinch the other foot. War producing while others convert back will just be painful, thinks Louis B. Lundborg, general manager of the San Francisco Chamber of Commerce, and a gentleman calm in counsel and level-headed in judgment. Mr. Lundborg and Maury Maverick favor a staggered process of terminating war contracts spread somewhat evenly over the nation, allowing smaller plants and little fellows to break ranks first and start heading for the long run goal, in order that the final finish between the long legged and short legged contestants may be more even and well matched.

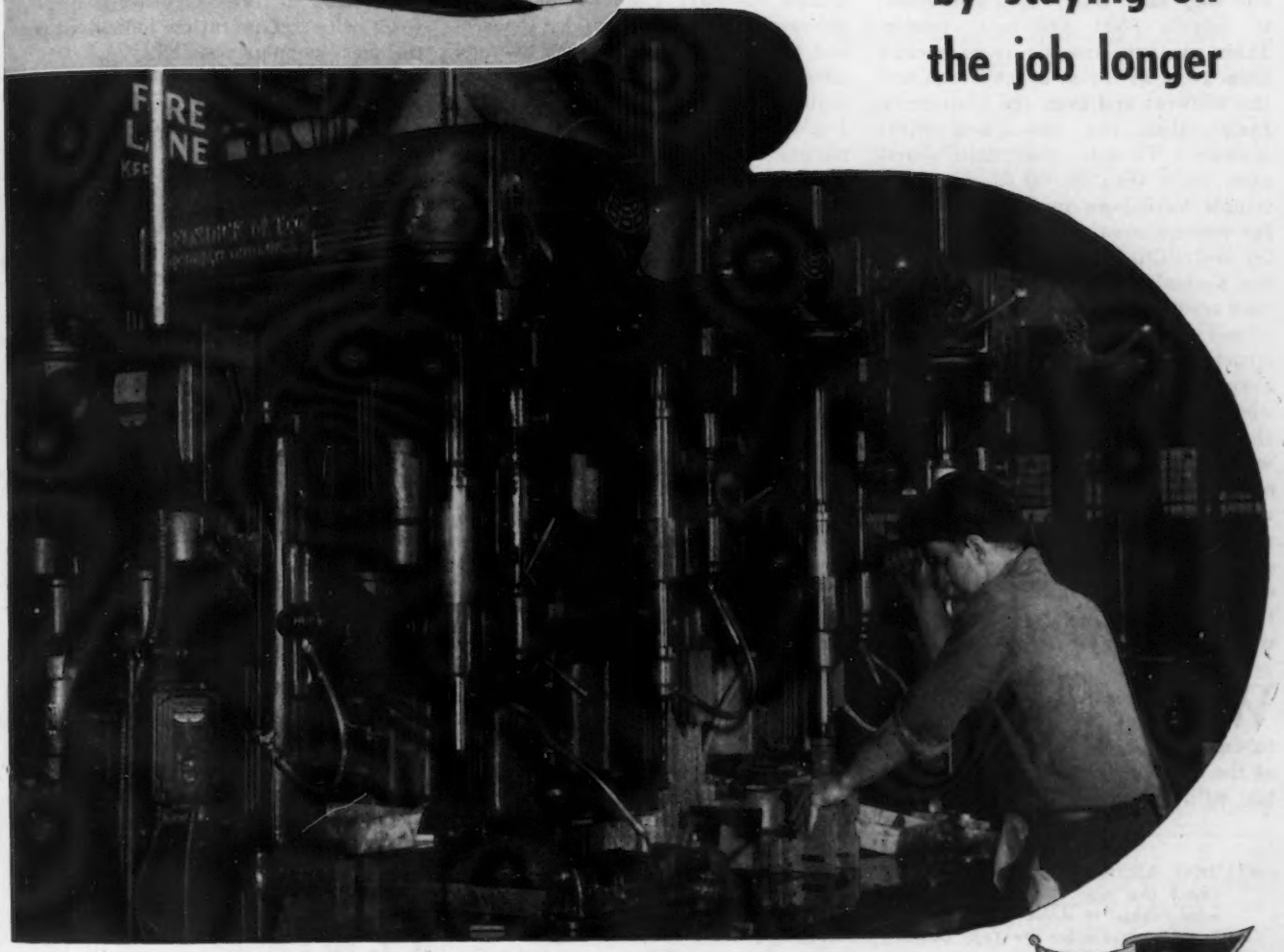
CURRENTLY some 300,000 fewer persons are employed in non-agricultural establishments in the seven states west of the Rocky Mountains than a year ago when a peak of 4,200,000 employees was reached

BUSMEN'S HOLIDAY: *Five leaders of the Pacific Coast's booming shipbuilding industry take a day off to attend a launching at the Marinship yard at San Francisco. They are, l. to r., K. K. Bechtel, president of Marinship Corp.; S. D. Bechtel, chairman of the board of California Shipbuilding Corp.; Felix Kahn, vice-president of the Joshua Hendy Iron Works; Edgar Kaiser, vice-president and general manager of the Oregon Shipbuilding Co.; and Henry J. Kaiser, president of Kaiser Co., Inc.*





# Let's keep 'em FLYING by staying on the job longer




# FOSDICK HIGH SPEED DRILLS

ARMY (E) NAVY

As we move in closer and closer on our various battle fronts, the need for planes increases daily. Regardless of the number of planes they need—no matter what the objective may be—let's give them all the planes—tanks—guns—and ammunition they can possibly use on all fronts—when they want them.

To do this means that every man in our vast army of workers must stay on the job—all of the time to make sure we do not let our boys down at a critical moment.

At the Bell Aircraft Corporation a battery of Fosdick High Speed Drills are doing their part in drilling, reaming and boring parts for airplane construction. They are maintaining close tolerances and speeding up production of thousands upon thousands of critical parts. The machine illustrated is typical of the way a wide variety of jobs are being handled at Bell Aircraft—accurately—quickly—at low cost on Fosdick High Speed Drills.

Fosdick Drills have the stamina for "round-the-clock" production—range of feeds and speeds to handle a wide range of operations—may be furnished singly or in multiple spindles up to six to accommodate work requiring operations in sequence without removing the work from the jig.

Full details are available in the Fosdick High Speed Drill Bulletin—H.S. 1. Write for a copy today.

**FOSDICK MACHINE TOOL COMPANY**
CINCINNATI 23, ··· OHIO

in August. This is according to the statistical department of the Federal Reserve Bank for its 12th district. Kaiser-Richmond shipyards confess a drop in the number of their workers of 20,000 since the first of the year and they have lately been authorized to recruit 8500 additional people. Their present struggle is to recruit them from as far away as Texas and the midwest and even the deep south faster than the quits and withdrawals. To help meet such shortages more than 50,000 Mexican nationals have been imported into the far western area under arrangements for their ultimate return. Yet, except for agriculture, foundry labor, railroad track maintenance and some unskilled dirt moving and heavy construction work, Mexicans are not always welcome. Workers in the woods for logging have been crucially short in the Pacific Northwest, but when it was proposed to bring in skilled Mexican workers from the mountains, as choppers and woods sawyers, it is understood the well organized mill and lumber workers of the Pacific Northwest objected to the point that they would walk out when, as and if.

WEST Coast Maritime shipbuilders point with pardonable pride to certain data in the recent report of the Truman Investigating Committee with reference to Liberty ship construction. As of May 31, 1944, of the 2158 Liberty ships delivered, 53 per cent came from Pacific Coast yards and 23 per cent from the Permanente Richmond yard. The first Liberty ship, the Patrick Henry required 244 days from keel-laying to delivery into service, but by the second year of construction the average time had been reduced to approximately 42 days. During World War I a similar type of vessel, although not more than two-thirds the size of the Liberty ship, required 10 to 12 months and original estimates for the program contemplated 210 days. Of the 17 yards operated by 15 shipbuilding companies on the Atlantic, Gulf and Pacific coasts, six yards averaged less than 600,000 man-hours per ship. Among these top-ranking six, four were West Coast yards, two at Richmond, one at Portland and Cal-Ship at Wilmington. In shipbuilding at least, this seems to indicate that management, labor efficiency and general industrial working conditions are even more favorable on the West Coast than elsewhere nationally.

* * *

**Steamfitters Local** 590, AFL, claims 18,000 members working in shipyards in the vicinity of San Francisco. This union recently took a postcard ballot among its members and reports returns from 15 per cent which indicate that 62 per cent of the members want to stay in the Bay area in the postwar period, 11.4 per cent will "go back home," and 26.2 per cent are undecided or open to propostions. Only 8 per cent will quit pipefitting although over half the membership are willing to train for other postwar work with refrigeration indicated as the most popular possibility. A separate poll of women members indicated that although 53.8 per cent want to remain in the Bay area, 61.5 per cent were planning to quit steamfitting.

* * *

**Assessed valuation of the** Fontana steel mill by San Bernardino County has been increased from last year's $8,914,860 to $10,200,000. The assessor figured $14,493,060 but the county board of supervisors conceded to pleas that industry be encouraged to provide postwar jobs for returning service men. On RFC books the outlay for the enterprise is approximately $100,000,000, though not quite all for physical assets in San Bernardino County.

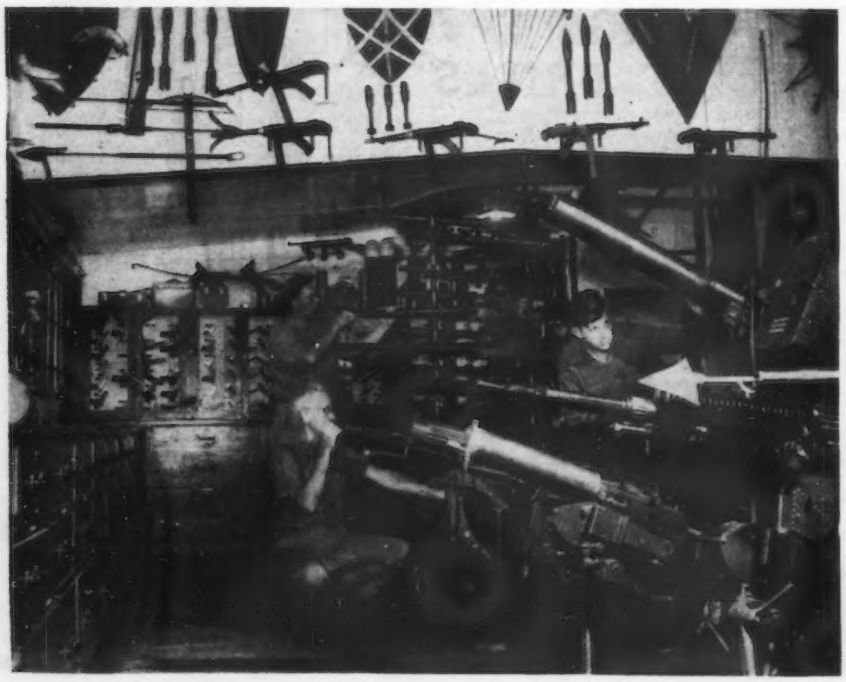
* * *

**A $650,000 super-cafeteria** seating 1600 persons, largest on the West Coast, was opened at Boeing's Plant 2 in Seattle last week. A special building 212 by 220 feet was erected and a separate food service center supplies 40 mobile units designed to serve ten customers per minute throughout the plant throughout the day. The enlarged feeding program requires its own personnel of 450. Industrial Foodcrafts of Elizabeth, N. J., has contracted to operate the cafeteria and in-plant feeding program.

* * *

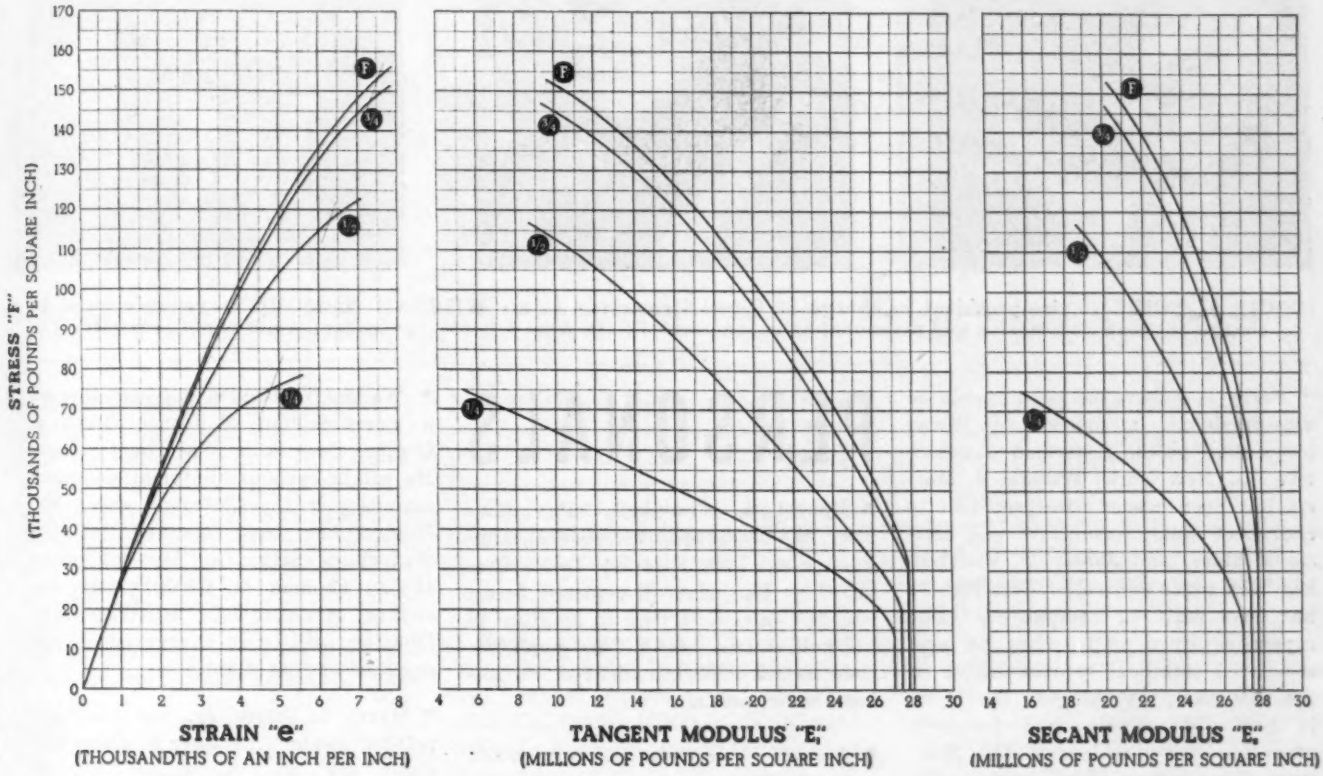
**At quite an up-town** Hotel Biltmore luncheon ceremony, 500 southern California industrialists and labor leaders were recently present when William Conover, Jr., U. S. Steel executive from Pittsburgh and now assistant director for Training Within Industry under the Manpower program at Washington, awarded the 100,000th TWI certificate to a supervisory worker in the southern California, Arizona and Clark County, Nevada area. Mr. Conover stated that 12,250,000 workers have been affected nationally by the program in its three and a half years, reaching 14,000 plants with 1,250,000 supervisors. There are only 385 men in TWI, for the agency operates through each company's own personnel, organizing self-operating and perpetuating instruction.

STUDIO ARSENAL: *In Hollywood, 20th Century Fox employees clean and check the guns in the studio arsenal. Valued at $100,000, these guns were once rushed to defense areas on the West Coast to supplement sparse Army supplies just after the Japs bombed Pearl Harbor.*



## What the Design Engineer Should Know

# ABOUT HIGH TENSILE STAINLESS




These curves show the tensile properties of ARMCO High Tensile Stainless Steel Sheets from tests made on longitudinal specimens as cold rolled. They are reproduced from a practical new handbook that contains compression and tension values of high strength stainless for the complete useful range.

These data give the stress-analyst and designer the information needed to proportion stronger, lighter structural parts with *less* stainless. Construction of light-weight transportation equipment demands adequate knowledge of the compressive strengths that can be expected from the materials you use.

Besides the detailed values for stainless, the handbook covers some fundamental concepts of design theory to be considered when using stainless steels at the high stress levels where they are most effective. Mechanical properties of the stainless steels and derived design data are also included in the book.

| | | ¼ Hard | ½ Hard | ¾ Hard | Full Hard |
|---|---|---|---|---|---|
| Ultimate Strength—thousands of lb. per sq. in. | $F_{tu}$ | 133 | 162 | 183 | 187 |
| Yield Strength at 0.2% Offset—thousands of lb. per sq. in. | $F_{ty}$ | 75 | 117 | 147 | 153 |
| Proportional Limit at 0.01% Offset—thousands of lb. per sq. in. | $F_{tp}$ | 35 | 49 | 59 | 61 |
| Initial Modulus of Elasticity—millions of lb. per sq. in. | $E_o$ | 27.0 | 27.5 | 28.0 | 28.0 |
| Elongation—per cent in 2 in. | | 46 | 37 | 31 | 29 |

If you are a designer of light-weight structures, write us on your company letterhead for a free copy of this handbook. It is titled: "Design Data on High Tensile Stainless Steel Sheets for Structural Purposes." You'll find it a valuable addition to your design manuals. The American Rolling Mill Company, 2611 Curtis Street, Middletown, Ohio.

EXPORT: THE ARMCO INTERNATIONAL CORPORATION

STAINLESS ARMCO STEEL

## THE AMERICAN ROLLING MILL COMPANY

PERRY T. EGBERT, vice-president in charge of Diesel locomotive sales; WILLIAM S. MORRIS, vice-president in charge of steam locomotive and divisional sales, and JAMES D. VAUGHAN, controller, American Locomotive Co.

# PERSONALS

• **Perry T. Egbert** has been appointed vice-president in charge of Diesel locomotive sales, American Locomotive Co., New York; **William S. Morris** has been named vice-president in charge of steam locomotive and divisional sales, and **James D. Vaughan** has been made controller. Mr. Egbert has been with the company in sales capacities since 1921, when he was appointed technical representative in the Far East, returning to the U. S. in 1924. Mr. Morris was formerly executive vice-president of the Montreal Locomotive Works, Ltd., the company's Canadian subsidiary. Mr. Vaughan has been executive assistant to the president for seven years. Previously he was with Price, Waterhouse & Company as supervising accountant.

• **P. T. Keebler** has been appointed plant manager of the Industrial Car Division, Phillips Mine & Mill Supply Co., Pittsburgh.

• **Jesse J. Baum**, until recently process engineer and metallurgist with the Allison Engineering Division, General Motors Corp., has joined The Duraloy Co., Scottdale, Pa., as plant superintendent. Mr. Baum has held metallurgical and supervisory positions with National Alloy Steel Co., Ohio Steel Foundry Co., Universal Cyclops Corp., and Ingersoll Steel & Disc Division of Borg Warner Corp.

• **E. J. Johnston** has been appointed manager of the new Detroit district office, Nox-Rust Corp., Chicago. **N. J. Mollhagen**, formerly chief metallurgist for Motor Products Corp., has been made technical engineer.

• **Robert A. Campbell**, sales manager, has been appointed general manager, Steel Tube Division, Talon, Inc., Oil City, Pa. He will continue to direct the sales activities in addition to his new duties. **John Farrimond** has been named superintendent of Finishing Departments.

• **Albert W. Genske** has been made general manager of the Lackawanna plant of Buffalo Tank Corp., succeeding **Ralph F. Johnson**, vice-president, who has been transferred to the Dunellen (N. J.) plant, where he will serve as general production manager for both factories.

• **Frederick W. Mesinger** has been elected a vice-president, Norma-Hoffmann Bearings Corp., Stamford, Conn., succeeding **H. J. Ritter**, who recently resigned. For the past 16 years Mr. Mesinger has been district manager of the New York office. **Robert L. Miller** and **Carl W. Hedler** have been appointed eastern sales manager and western sales manager, respectively.

• **Walter F. Morton** has been made works manager of both the Foundry and Factory Divisions of the Anstice Co., Inc., Rochester, N. Y. Mr. Morton has been with the company since 1925, formerly serving as factory manager and chief metallurgist. **Harold King** has been appointed chief metallurgist, and **Frank M. Miller** has been made head of the newly developed Centrifugal Casting Department.

• **Wallace C. Husted** has been elected a vice-president of Chase Brass & Copper Co., Inc., Waterbury, Conn. He will be responsible for all company activities in the Cleveland area. Mr. Husted has been manager of the Waterbury Mfg. Co. Division since 1935. **Thomas H. Chamberlain**, assistant manager of the Waterbury Division, will be in charge of all operations at that plant.

• **Harry L. Smith, Jr.**, has been appointed product manager of aluminum sheet for the Aluminum Co. of America, and **Wiser Brown**, product manager for sand and permanent mold castings in addition to his duties as vice-president and general manager of the American Magnesium Corp., wholly-owned Alcoa subsidiary. **Hugo T. Wilder** of Newark, N. J., sales office, has been made product manager of ingot, and **Roswell Whidden**, manager of the Chicago office, has become product manager for tubing and extrusions.

• **Elias C. Atkins** has been elected president of E. C. Atkins & Co., Indianapolis, succeeding his father, the late Henry C. Atkins. **Keyes W. Atkins** has been elected first vice-president in charge of sales.

• **F. T. Turner** has been made assistant sales manager of the Brush Division, Osborn Mfg. Co., Cleveland. He will organize sales planning for the division and will assist M. C. Pecsok, sales manager.

• **Winfred L. Foss has been appointed manager of the Boston district sales office of American Machine & Metals, Inc., East Moline, Ill.**

JAMES J. MELLON, president, and W. H. WILLIAMS, executive vice-president and general manager, Clark Controller Co.

J. E. SWANSON, vice-president, Graver Tank & Mfg. Co., Inc.

• **James J. Mellon** has been elected president, Clark Controller Co., Cleveland, succeeding the late P. C. Clark. **W. H. Williams,** former vice-president in charge of sales, has been appointed executive vice-president and general manager, a newly created position designed to divide duties more equitably. Mr. Mellon for 15 years was assistant sales manager of the company, and more recently vice-president of the company. Mr. Williams was a co-founder with Mr. Clark in establishing the company.

• **M. W. Field** has been appointed controller of the American Steel & Wire Co., Cleveland, U. S. Steel subsidiary. Mr. Field has been associated with U. S. Steel subsidiaries for the past five years, joining first Carnegie-Illinois Steel Corp. in Pittsburgh, and later in 1941, becoming procedure supervisor of the U. S. Steel Corp. of Delaware.

• **Ronald J. Sweeney,** industrial engineer, has been appointed director of research of the Stover Lock Nut & Machinery Corp., Easton, Pa.

• **K. R. Van Tassel** has been named manager of the Industrial Control Division, General Electric Co., Schenectady. He succeeds **George R. Prout,** recently appointed manager of the company's Air Conditioning and Refrigeration Division of the Appliance and Merchandise Department. Mr. Van Tassel has been with General Electric since 1925.

• **Willard B. Dunham** has been appointed assistant western sales manager, Russell, Burdsall & Ward Bolt & Nut Co., Chicago.

• **R. H. Olson,** formerly manager of the New York district office of Electric Machinery Mfg. Co., Minneapolis, has been appointed vice-president in charge of sales, with headquarters in Minneapolis. **A. P. Burris** has succeeded Mr. Olson as district manager at New York.

• **Ralph T. Seward** has been named impartial umpire in appeal cases under General Motors Corp.'s contract with the UAW (CIO). Mr. Seward succeeds **G. Allan Dash, Jr.,** who has resigned as GM-UAW umpire to become chairman of the review and appeal section of the NWLB in Washington.

• **A. B. Johnson** has been named plant manager of the Cleveland Pneumatic Tool Co., Cleveland, and will have complete responsibility of all manufacturing facilities. **Conrad W. Wallin** has been appointed plant manager of Cleveland Pneumatic Aerol, Inc., a wholly-owned subsidiary of Cleveland Pneumatic.

• **J. E. Swanson** has been elected a vice-president of the Graver Tank & Mfg. Co., Inc., East Chicago, Ind. Mr. Swanson has been with the company for more than 25 years, serving in various executive capacities, and most recently as general manager of sales.

• **D. J. Gent,** formerly resident manager of sales at Dallas for the Jones & Laughlin Steel Corp., Pittsburgh, has been transferred to the Detroit district sales office. He has been succeeded by **D. M. Griffith,** of the Atlanta district sales office. **E. A. Toothaker** has been appointed resident manager of sales of the Denver sub-office.

• **Warren H. Clarke** has been appointed works manager of the Bell Aircraft Corp.'s Ordnance Division, Burlington, Vt. He succeeds **Carl F. Lozon,** who has become manufacturing manager of the Ordance Division.

# OBITUARY...

• **Munson H. Treadwell,** founder of M. H. Treadwell Co., Inc., New York; Treadwell Engineering Co., Easton, Pa., and Treadwell Construction Co., Midland, Pa., died suddenly in New York City on July 9. Mr. Treadwell had retired from active business some years ago.

• **Noel Robinson,** president, South Penn Oil Co., Pittsburgh, died July 16.

• **John V. W. Reynders,** consulting engineer, New York, died July 10.

• **George B. Glassford,** purchasing agent of Lindberg Engineering Co., Chicago, since 1937, died suddenly July 13.

• **Alfred E. Buelow,** 53, chief consulting engineer of the Lamson & Sessions Co., Cleveland, died suddenly July 12 in Chicago. He had been connected with Lamson & Sessions through his business career which dated from 1917.

• **Charles L. Smith,** for 45 years with the General Electric Co., Lynn, as superintendent of its transformer department, died recently. He was 75 years old.

# Fatigue Cracks . . . BY A. H. DIX

### Varga and Volga

• • • We see by the papers that *Esquire* has lost the first round of its legal bout to have the post office restore its second-class mailing privilege. The court granted that the regulation limiting the second-class rate to publications of an educational nature was adopted when McGuffey's First Reader was regarded as a prime exemplar of the qualification "educational," but held that the post office acted within its rights.

As we and *Esquire* work different sides of the street, we are glad to put in a kind word for it. If the post office thinks that life with *Esquire* is all Varga girls and endless variations on the Topic A theme, it is wrong. In the background is a solemn note. We know there is, for John E. Shepherd, *Esquire's* research director, recently wrote us for a clipping of our Nov. 25, 1943, article, "*Postwar Russia, A Market for American Industries.*"

### Your F.F.J. is Theirs

• • • If this means that Mr. Shepherd is casting sheep's eyes at the Russian postwar market, he has chosen a worthy target, for the U.S.S.R. will not only be the most solvent of the postwar export markets, but will also be among the largest for industrial equipment, as it is planning to increase its steel-making capacity from some 28 million tons a year to 60 million. And it has a habit of attaining its objectives.

Which gives us an opportunity to report that your family journal has long been a favorite among the Soviets. The Russians are probably too busy just now to answer questionnaires, so we will rely on past evidence and our natural bias to support our belief that no other imported industrial journal is as influential there as we are.

### Wisecrack

. . . Your July 6 News Front reports "Axles and wheels are short." Lawd, they made the tracks too wide.

—*H. F. Cotter*

### Aptronyms

. . . The Columbus, Ohio, Sunday Dispatch has an editor named Morgan Penn and an artist named Donald Ink.

—*Richard W. Parsons, Mansfield, Ohio*

### Fiery Orchid From South Seas

• • • We suppose the *Esquire* people saw this letter from a naval lieutenant in the South Pacific, published in the newspapers:

> What right has anyone to change these things that we are fighting for without our consent? Esquire is not only a magazine; it is an institution. We are out here not fighting for a new, idealistic world; we are fighting for the world we know, the life we lived in the past.

The officer believed that *Esquire* had been forbidden the privileges of the mails. This is not so; it has been deprived of the right to mail at second-class rates, which are from a half to a third those of third-class. But that does not detract from the tribute, which is surely among the most fervent any publication has ever attracted, even exceeding in incandescence our favorite, "*The* IRON AGE *is part of our lives.*"

### Expectancy

• • • The only letter we have had from the South Pacific recently is from William A. J. Phair, of the brains department, who is at the moment with the Seabees. If he is concerned about *Esquire's* plight he conceals it manfully. His letter concerns expectancy in New Guinea. Excerpt:

> The natives here consider 30 to 35 as being old. Few live beyond that age.

We are tipping off Tom Cullen, who edits our sister publication, *The Spectator*, the life insurance authority, to tell his readers to lay off New Guinea.

### In Our Ignorance

• • • A couple of issues ago we addressed an open letter of thanks to the unknown inventor of the useful device, "Stet," for informing the printer that something crossed out is to be left in. It is so perfectly adapted to its purpose that we had a vague idea it was a reversed contraction of "Let stand," which is exactly what it means.

But Evert W. (B. F. Sturtevant Co.) Andros sets us straight:

> To find the inventor of "Stet," you will have to find the archfiend who invented the Latin language, for "Let it stand" is the literal translation of the third person singular in the subjunctive mood of the verb "stare."
>
> Doubtless the original use of "Stet" dates back to the time in the Middle Ages, when printing was largely in the hands of the monks in the monasteries, who conversed exclusively in the classical tongue.

### He Wakes Up To A Screech

• • • Stan ("Assembly Line," see page 60) Brams tells us that Nat (Continental Motors) Hopkins, an alarm clock-o-phobe, has a clock attached to the electric range in his kitchen, which is timed to start the heating coil under a singing teakettle at 6:50 A.M. each morning, except Sundays. By 7 o'clock the teakettle begins to screech, awaking the Hopkinses, big and little, one of whom dashes downstairs and makes the coffee.

To us an alarm clock is music compared with the scream of the misnamed singing kettle. It has always seemed to us that the quickest way of driving anyone mad would be to tie him alongside of a battery of them.

But everyone to his taste.

### Postcard Propagandist

• • • We hope that Don MacDonald, your Cleveland legman, who by-lined the second one, "Design for Postwar Planning," will be sufficiently grateful for the plug to do a favor for us. What we want him to do is to call on A. B. Walton, of 1472 Cordova Ave., Cleveland 7.

Mr. Walton sends us mysterious postcards headed, "The Unorganized Society of Simple Saps (Global)," and bearing one-line typed messages, such as:

> This is a poor time for any industry to try to outsmart the public which supports it.

and:

> The publicly owned radio will serve all mankind. Yours for a peaceful planet.

The latter card is addressed to the "Department of Mental Nutrition" and contains this additional pronouncement, "*Purse power and politicians are on the way out.*" What we would like Mr. MacDonald to find out is whether Mr. Walton has any inside dope or whether he is merely guessing, and why he goes to the trouble.

### Puzzles

Last week's printer needs 756 pieces of type.

James T. (American Cast Iron Pipe) MacKenzie and a bashful Bethlehemite, who withholds his name, submit an alternate identical answer to the July 6 problem, "Write 31 using only the digit 3 five times." Their solution, which we prefer to the one in our puzzle book, is: $33 - 3\frac{3}{3} = 31$.

If you can do this one in your head within 20 seconds you are definitely a master mind:

> *If I were to give 7c. to each of the beggars at my door, I would have 24c. left. I lack 32c. of being able to give them 9c. apiece. How many beggars are there, and how much money have I?*

# GIRL POWER—as Useful as MANPOWER

## WITH *Northern* HI-LIFT ELECTRIC HOIST and *Northern* TRAVELATOR

No "beef and brawn" is needed to handle heavy loads with a Northern Hi-Lift Hoist. It's so easy to manage that girl power can be as useful as manpower.

Fast—powerful—built to take plenty of overload—the Northern Hi-Lift Electric Hoist also has extreme high hook lift—makes maximum use of headroom. Write for Bulletin H.

### THE NORTHERN TRAVELATOR

Provides electric travel for hand-travel cranes. It is inexpensive and any good mechanic can apply it in two or three hours. No part of the crane is dismantled. Push button control, with pendant push arranged to follow the load. Even a girl can operate a Travelator equipped crane. Write for Bulletin T.




**NORTHERN ENGINEERING WORKS**

**General Office: 2607 Atwater St., Detroit 7, Mich.**

NORTHERN CRANE & HOIST WORKS LIMITED, WINDSOR, CANADA

*OFFICES IN PRINCIPAL CITIES*

# Dear Editor:

## ENGINEERS' OATH

Sir:

That is a truly fine editorial in your July 13 issue, "The Hippocratic Oath for Engineers." I would add another Hippocratic oath and it would be taken by the employers of engineers. I would have them swear:

That they will rescue the noble title of "engineer" from the ignominy into which it has fallen, whereby mechanical service men, salesmen and others of small technical education are permitted to endow themselves with the title.

That they will accord engineers the standing in their organizations to which their technical standing entitles them, and not lump them in as a variety of mechanical labor.

That they will compensate them in some reasonable relation to the value they create and the savings they effect; and that they will not degrade educated, intelligent and highly trained specialists, dependent for their existence on their sale of intangibles, to the day-wage rates and treatment of machine operators and laborers.

That they will constitute engineers as a part of management and accord them the voice which their qualifications justify.

The spectacle of men who have devoted thousands of dollars, years of time and untold effort to the achievement of a technical education and qualifying experience—the spectacle of men like that being hired for $50 a week for the duration of a brief contract and then being sacked off like so many shovel hands is a disgrace to American industry.

*ALFRED WATERBURY MILLER*
*E. C. Van Dyke Co.,*
*55 Liberty St.,*
*New York*

---

Sir:

Thanks for your July 13 editorial "The Hippocratic Oath for Engineers." You have brought out admirably the fact that engineers must carry responsibility for developing social and economic relationships which will enable the world to exist in suitable harmony instead of bringing about destruction of civilization. You have performed a real service for our country by issuing this editorial. Enthusiastic thanks for it.

*BERNARD G. WARING,*
*President*
*Yarnall-Waring Co.,*
*Chestnut Hill,*
*Philadelphia 18, Pa.*

---

Sir:

Your editorial in July 13 issue entitled "The Hippocratic Oath for Engineers" merits grave consideration on the part of all engineers for I am quite sure every engineer recognizes the truth of your statement.

Luckily for the doctors and surgeons they started this idea when the profession was small and it grew up with them, for as I remember Hippocrates was one of the early physicians who lived in the days of 400 B.C.

You must admit that is somewhat of a head start for the doctors against the engineer, but, as I feel confidence in the engineer's ability to catch up with and surpass such a start, I can think of no person better qualified to promote the idea than your John H. Van Deventer, and to this end I offer the following suggestion.

Have reprints made of your editorial together with a short description of the purpose in mind.

Mail these to the heads of every engineering school and group of engineers such as the leading engineering societies and ask for cooperation on the idea.

Of course, foreign engineers could not be reached until after the war, but perhaps by that time they will have had enough of war to be in a cooperative frame of mind for by that time I imagine those German engineers will have decided it is useless for them to start something, for we appear to always be in the better position of showing them how to finish what they start.

I am sure you will find many who will cooperate with you in such an effort toward getting all engineers to subscribe to, shall we call it, "The Van Deventer Oath."

With all earnestness I hope you will feel that there is something you can do to lead such a movement.

*VAN RENSSELAER P. SAXE*
*100 West Monument St.,*
*Baltimore, Md.*

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## RING-SIZER

Sir:

We have a ring which is 0.154 in. by 0.050 in. which we would like to put into a sizing die in order to make it perfectly round after welding. During the last few months we have been watching your advertisements of machinery but have not found anyone offering such a sizing die for rounding our rings. Where can we get such a die?

*OTTO F. DINGELDEIN*
*St. Louis Silversmith,*
*2815 Olive St.,*
*St. Louis 3, Mo.*

● All that is needed is a simple sizing die such as any tool and die shop can make. There are a number of shops in St. Louis that can do this work—Ed.

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## CAST KIRKSITE BLANKING DIES

Sir:

Your May 4 issue has an article, "Cast Kirksite Blanking Dies." Where can we obtain additional information?

*HANS W. KRETSCH*
*Manning, Maxwell & Moore, Inc.,*
*Elias St.,*
*Bridgeport, Conn.*

● From J. G. Hurd, Superintendent, Methods Analysis, North American Aviation Inc., Inglewood, Los Angeles. Kirksite is a zinc base alloy supplied by the National Lead Co., 111 Broadway, New York. You might write the Kirksite Division of that company for further data.—Ed.

---

## BAR TURNER

Sir:

Would you be kind enough to give us the names of firms that make what is commonly known as "bar turning machines?"

*W. WALLACE McKAIG*
*Cumberland Steel Co.,*
*Cumberland, Md.*

● Medart Co., 3500 De Kalb Ave., St. Louis, makes a continuous automatic centerless turner for rough peeling bars or tubes.—Ed.

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## ELECTROLYTIC TINNING

Sir:

Your June 22 "News Front" mentions electrolytic tinning lines using a gas heat system to brighten the surface. This company has long been interested in such a scheme. Where can we get further information?

*VYTANT ALEKS,*
*Development Engineer*
*Washburn Co.,*
*Rockford, Ill.*

● From The Selas Co., Erie Ave. & D St., Philadelphia.—Ed.

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## SALT IN LADLES

Sir:

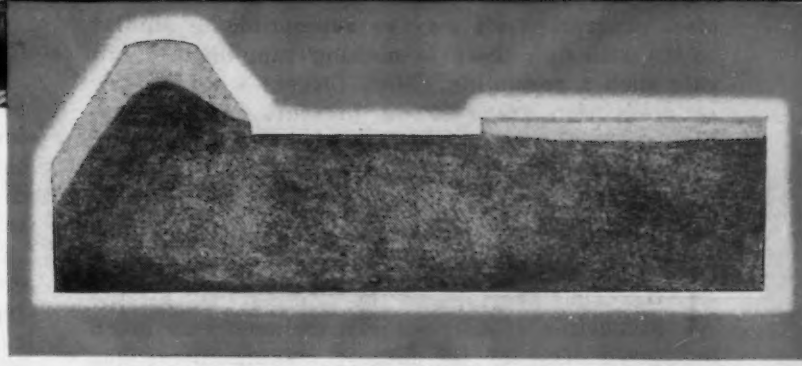
What advantage is there in adding salt to an open-hearth ladle? What new development on the spectrograph enables the detection of alloys in the spectrum of iron? In other words, what method is used to overcome the intensity of the light band produced by the excessive amount of iron in order to detect the metals which come within the same range on the spectrum?

*ADOLPH BECK*
*222 West 26th St.,*
*Erie, Pa.*

● Salt has on occasion been used in ladles as a fluxing agent but other more complex compounds are now in general use. Your question with regard to overcoming of intensity of the light band produced by excessive amounts of iron probably arises from a desire to secure greater accuracy in the determination of boron, which falls within that range. In about February, 1943, the AIME discussed this problem. The general practice is to employ a narrow slit on the instrument of high dispersion. Longer exposures with metal electrodes and a high voltage A.C. arc are also used. Dr. Irish of Bethlehem Steel Co., Bethlehem, Pa., has done a great deal of work on the problem and he may be able to give you additional information.—Ed.

# Bedway accuracy maintained

## BY MONARCH FLAME-HARDENING



Even though subjected to grueling service during wartime, the flame-hardened bedways of Monarch Lathes will retain their accuracy for peacetime operations.

The flame-hardening process was first adapted to machine tools by Monarch, in 1937. Since then, more than 18,000 Monarch Lathes with flame-hardened bedways (as well as many other important surfaces) have proved the practical value of this method. It gives cast-iron bedways a hardness equal to that of hardened steel, yet preserves the valuable qualities of the microscopic particles of graphite. Among other advantages, graphite provides a lubricative property to cast-iron sliding surfaces that is not found in steel. Thus bedway accuracy is maintained even under the most severe use.

The inset illustration is a full-size, unretouched photograph of a section of bedway from a Monarch Lathe and shows the depth of the hardening through which are distributed these graphite particles. A bulletin describing the process will be sent upon request. Ask for Bulletin No. 194.

Flame-hardening is but one of many outstanding developments in lathe design which have been made by Monarch. The same progressive engineering which has built Monarch's reputation in the past can be depended upon to maintain Monarch leadership in the future.

**THE MONARCH MACHINE TOOL CO. · SIDNEY, OHIO**

*DIRECT FACTORY BRANCHES AT*

801 Fisher Bldg., Detroit 2, Mich. • 10465 Carnegie Ave., Cleveland 6, Ohio
622 W. Washington Blvd., Chicago 6, Ill. • 1060 Broad Street, Newark 2, N. J.
512 Empire Bldg., Pittsburgh 22, Pa.

*Representatives in principal cities*

*Monarch Saves Time*

# This Industrial Week . . .

- ***Steel Order Volume Rises This Week***
- ***War News Not Effecting Steel Orders***
- ***Backlogs Are Heavy as Ingot Rate Drops***

STEEL order volume this week was heavier than a week ago with the result that backlogs were increased. A slight drop in the ingot rate was also sufficient to cause steel officials to question the possibility of increasing the ingot rate close to the 100 per cent mark.

Events of the past week hinting an early internal collapse in Germany and possibly Japan thus far have not been reflected in either steel order cancellations or a sharp drop in new business. To some extent these events have been previously discounted by a prevalent policy on the part of war contractors of buying for actual contract requirements rather than with a liberal margin for eventualities. No contract cancellations which might be attributed to the war news are evident either. To the contrary, there has been a sharp increase in tank-automotive contracts in the Chicago ordnance district, particularly affecting three firms.

The sharp slash in the shell container program, cutting steel requirements from 385,000 tons to 185,000 tons, leads some to believe that the shell steel program itself may be susceptible to similar action although there is nothing tangible to indicate such a possibility. Shell forgers who are now in production are exerting pressure for delivery, but in the light of past experience the plants not yet equipped may experience considerable difficulty in securing machinery and labor to meet the timetable.

THE labor shortage in the Midwest has hit the production of harvesting machinery very much as feared. One of the largest manufacturers has turned back unfilled a substantial proportion of his quota because of labor and the pressure of war contracts.

Pressure for plates continues unabated. Warehouses, which have been experiencing a heavy demand for their overall stock, report that they have been subjected to heavy raids for plates and sheets in mill quantities. Thus stocks in these items are nearly cleaned out.

During the past few days, the Maritime Commission has quietly awarded new cargo ship contracts for 262 vessels totaling 2,500,000 tons, of which 74 are Victory ships. Additional landing craft awards have been made, including many LSM, and more small tankers are on the boards.

Although rails and structurals are bearing the brunt of the shell steel program many other products are feeling its hot breath, including quality carbon bars, wheels, alloy semi-finished, and forging blooms.

The step-up in order volume this week was all the more important in view of the belief in some quarters that demand for steel had reached its peak. There was little indication this week of any easing in the volume of steel buying. As a general rule, weekly totals of bookings are not taken as an indication of a general trend. Ordering is usually heavy preceding the so-called quarterly directives. Quality steels this week were still tight as far as deliveries were concerned but Bessemer grades remained fairly free. Shell steel billets are still available in December on some mills but many orders continue to extend somewhat beyond this date. A considerable tonnage of sheets for landing mats was placed in the Cleveland district for delivery during the first nine months of 1945. This increase in sheet bookings is indicative of an expanded landing mat program.

THE scrap situation throughout the country continued easier this week. For the first time in several months Bureau of Mines figures indicated an increase in scrap inventories. The higher consumption of scrap reported by the Bureau of Mines reflected increased supply of home scrap. While most buyers were interested in heavy melting grades, there was still a disposition to watch stockpiles very closely. More scrap consumers this week were buying no more material than was actually needed to carry on operations. It is believed that most consumers will continue a hand to mouth buying policy pending clarification in the war news.

The national steel ingot operating rate dropped back to 96 per cent of rated capacity after last week's upswing of 96.5. Output declined in two of the major steel producing centers, Chicago, which fell half a point to 100.5 per cent, and Youngstown, also down half a point to 94.5 per cent. Production also decreased in the Western District, down two and a half to 93 per cent, and in the Eastern area, down four to 94 per cent. Slight gains occurred in Pittsburgh, up a point to 92; Philadelphia, up half a point to 99; Cleveland, up two to 98; Wheeling, up two to 98; Birmingham, up two to 99; Detroit, up half a point to 98.5, and St. Louis, up five to 106. Buffalo at 104.5 and Cincinnati at 98 remained unchanged.

• **PLATES**—Splashed all through last quarter with some sizes extended to February. Still in heavy demand. Maritime orders show no letup. Alloy grades available in Sept. on some mills. Rolling capacity taxed.

• **SHAPES**—Demand reported somewhat heavier. Schedules slipping to November which is now critical on some mills. Better demand and shortage of rolling capacity due to shell needs affecting deliveries.

• **BARS**—Large reported currently most heavily ordered product even leading sheets and plate. Quality steel large sizes in shell program have advanced to critical for April, many in May, one mill into June 1945. Bars under 1⅛ in., some as early as Oct. and Nov. but other mills well into early first quarter. Bessemer is easier than open hearth and quality steels are tightest in large sizes. Steel capacity is termed limiting factor on quality steels but rolling capacity is also believed to be restricting factor.

• **WIRE**—Merchant wire is limited to late third quarter but mostly in fourth quarter. Quality steels are shortest. Heavy orders are recorded. Spring wire and cold heading are into Dec. and Jan. Woven wire products are easing somewhat as farm year closes. Nails are tight on some mills but obtainable in Sept. and Oct. on others. Bessemer slightly easier than open hearth.

• **TIN PLATE**—All on directive. Mainly available in Nov. and Dec. Strong and continuing demand seen regardless of war outcome.

• **ALLOY**—Alloy plates obtainable in Sept. Order volume—is poor and expected to decrease. Other alloy products available late third and early fourth quarter depending on rolling capacity of mill.

• **SHEETS**—Continuing heavy demand seen despite war outlook. Orders very heavy and many deliveries promised for Feb. and later. Some tonnage in 18 gage booked to April which is critical. Cancellations have not eased picture despite shell container cutbacks. New landing mat commitments extend through first three quarters of 1945. Some sizes and widths promised as early as Nov. due to WPB switching on mills. Directives playing hob with Schedules.

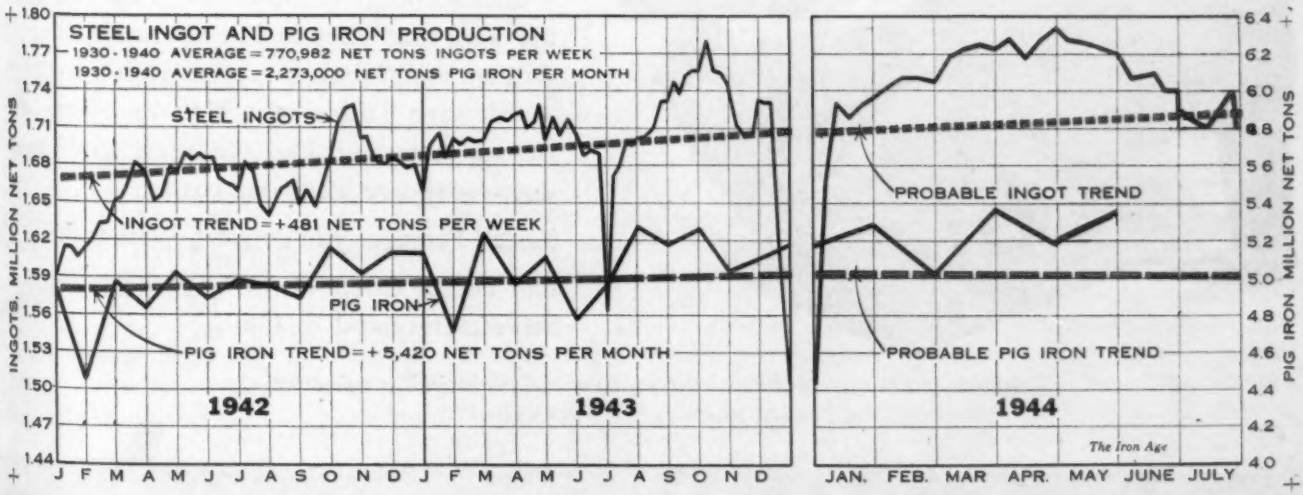
• **SEMI-FINISHED**—Ingots are fairly easy. Forging ingots can be had in Sept. but blooms and slabs are critical in April. Smaller sizes available late fourth quarter. Lend-lease for fourth quarter expected to be increased. Quality steels tightest but rolling capacity is limiting factor. Reduction in railroad program may result from this tightness which has taken over rail mills and steel tonnages.

• **PIG IRON**—Domestic production of pig iron, exclusive of ferro-alloys totaled 60,765,195 net tons in 1943, an increase of three per cent over the previous record year of 1942, according to the bureau of mines, United States Department of the Interior. The output in 1943 comprised 60,692,620 tons using coke and 72,575 using charcoal as fuel. Pennsylvania was the largest producer of pig iron in 1943, with 31 per cent of the total; Ohio ranked second with 23 per cent.

• **STRUCTURAL**—June, 1944, bookings of fabricated structural steel for bridge and building construction reported to the American Institute of Steel Construction by companies representing 77.8 per cent of the total average of the industry during the year 1923-1925; totaled 58,982 tons This figure compares with 34,163 tons for May, and 79,409 tons for June of last year.

• **INEQUALITY SQUABBLE**—The dispute between International Harvester, McCormick Works, and the metal workers' union indicate that there is still plenty of unrest between workers and producers in the Chicago area despite the fact that war production has about reached its peak. The question of whether or not intraplant inequities exist appears to be the crux of the matter. However, the sixth regional board of the WLB is sticking by its guns in denying the union's request for a general wage increase.

The Iron Age




## *Steel Ingot Production by Districts and Per Cent of Capacity*

| Week of | Pittsburgh | Chicago | Youngstown | Philadelphia | Cleveland | Buffalo | Wheeling | South | Detroit | West | Ohio River | St. Louis | East | Aggregate |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| July 20 | 91.0 | 101.0 | 95.0 | 98.5 | 96.0 | 104.5 | 96.0 | 97.0 | 98.0 | 95.5 | 98.0 | 99.0 | 94.0 | 96.5 |
| July 27 | 92.0 | 100.5 | 94.5 | 99.0 | 98.0 | 104.5 | 98.0 | 99.0 | 98.5 | 93.0 | 98.0 | 106.0 | 90.0 | 96.0 |

# HOW TO LUBRICATE ALL OF YOUR BEARINGS *at once*

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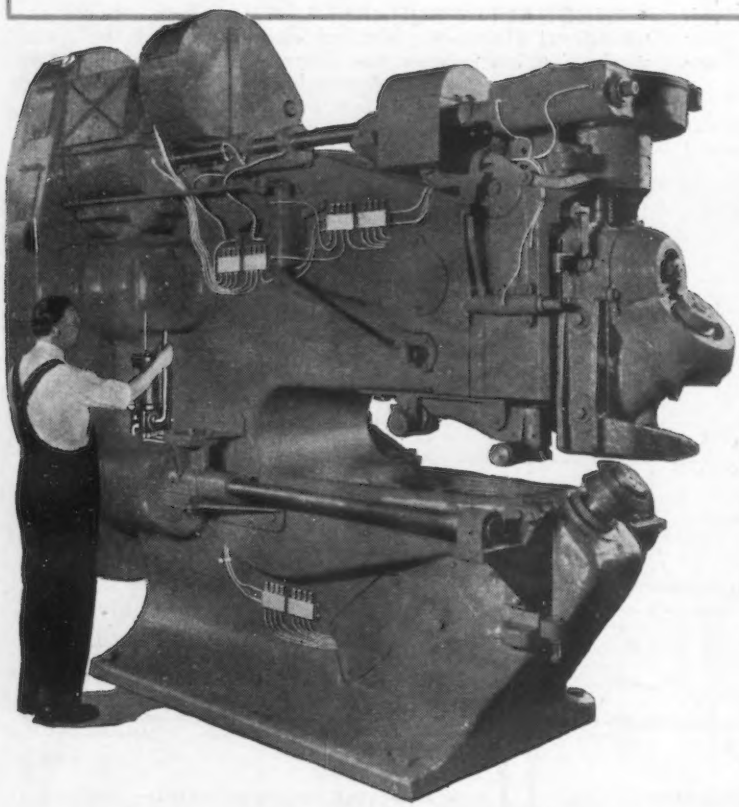

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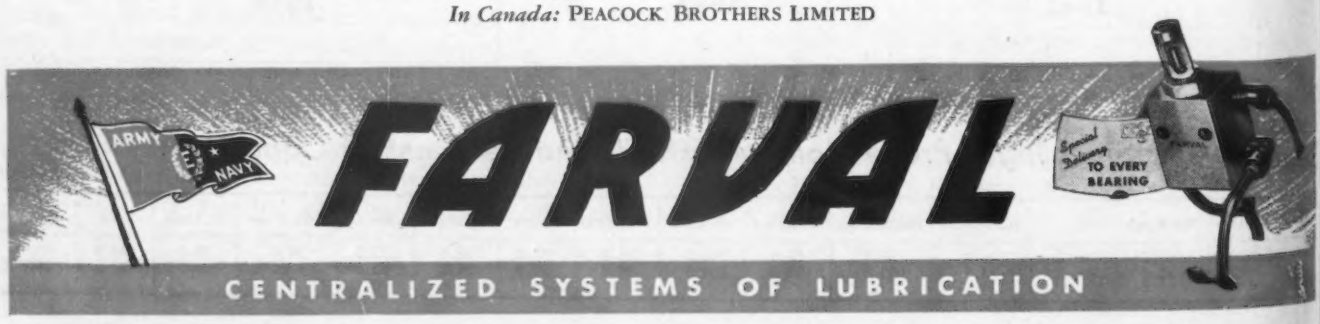


# The Army Orders Jet Propulsion Engines

*New York*

• • • **That the Army is going into** production of jet propulsion aircraft turbines became a foregone conclusion this week with the announcement here by the General Electric Co. that it would devote 600,000 sq. ft. of floor space to the program.

The announcement, cleared through the War Department, said that the amount of floor space is greater than that available in any but three of the leading aircraft engine plants in the United States before the war. Only the completion of other war orders made the space available in the company's second largest war plant.

It was also understood that General Electric has been conducting preliminary negotiations with a large aircraft engine manufacturer to undertake the production of the turbines as GE's capacity is not equal to the War Department's proposed schedules of production.

No official word was forthcoming from either the General Electric people or the Army Air Force as to the purpose to which the turbines would be put but it is known that the Air Forces have never considered jet propulsion the answer to the German robot rockets. The Air Forces believe that the jet propelled turbine should be considered as a power plant for extremely fast and very high flying fighter planes which are more effective and undoubtedly more accurate than the indiscriminate barrage of robots.

However, some experts believe that the superior speed of the jet plane brings it into consideration as a pursuit ship against the robots. They point out that with speeds up to 600 mph., Allied aviators might better be able to observe and measure the trajectory of the robots and thus locate their bases. Moreover, such speeds would give Allied airmen a better chance of destroying the robots in the air.

The size of the contemplated turbine production program indicates that the Army may have in mind an early use for the device despite the fact that perfection of any new type aircraft engine has heretofore taken as much as ten years. It was learned that the engine has already been perfected sufficiently to warrant its installation in one or more specially built aircraft by Bell which are now in test flights by both the Army and Navy at Wright Field and elsewhere.

JET PIONEER: *Flight Comdr. Frank Whittle, C.B.E., who with his group in England has pioneered in the field of jet propulsion engines since 1933. This week, the General Electric Co., announced that 600,000 sq. ft. of floor space would be used for the production of the jet turbines.*

In addition to the work being done in this country on the jet plane, it is understood that Flight Comdr. Frank Whittle has been experimenting with his group in England for 15 years. During his college days, Whittle spent much time and study on the jet propulsion engine and in 1933 the first such engine was built. This early engine ran successfully after improvements in 1937. It was used to power a Gloucester plane in 1941. In the fall of 1941, the project was brought to America and turned over to the General Electric Co. and Bell Aircraft.

Although details are lacking, it is known that the Thompson-Houston Co., British affiliate of General Electric, has been producing the turbines in England, but the extent of this development is not known.

On October 1, 1942, a series of tests of the device was started by Robert M. Stanley, chief test pilot of Bell Aircraft, in the California desert. He determined that the plane would not only fly but fly at terrific speeds and that it would handle easily. Jack Woolams, another Bell pilot, put the plane through altitude tests later that show improved efficiencies at heights which would make propellers lose their effect.

Tests have shown that the jet turbine, at its best efficiency, produces three hp. per lb. of its own weight as compared with the best efforts by reciprocating engines of about 1 hp. per lb. Therefore, a 1000 lb. jet engine would produce 3000 hp. under proper conditions, while for the same power a reciprocating engine would weigh 3000 lbs. The difference in weight is available for fuel or armament.

Flight testing of the jet turbine has shown that it requires much more fuel per mile than its elders but it can use almost any type of hydrocarbon in the place of high octane gasoline. It has also been proved that fuel efficiencies in the jet engine increase with its speed.

## Bomb and Engine Parts Output Stopped by Strikes

*Pittsburgh*

• • • **Two strikes,** both entering their second week, have affected bomb and land mine production and the production of diesel engine production parts. At the two Pittsburgh plants of Pennsylvania Transformer Co., strikers have held up bomb production over a wage dispute. The strike started when some 80 workers walked out when the company posted notice that an incentive wage rate was to be discontinued on orders of the wage hour division. The strike spread throughout the plants, and now involves about 325 workers.

A work stoppage among nearly 1100 employees of Dresser Mfg. Co., and its affiliate, Bovard & Seyfang Co. at Bradford, Pa., scheduled a back to work vote early this week. These workers are protesting a decision of the War Labor Board on recent wage rate demands. Both companies are producing diesel engine parts.

# OPA Announces New Resale Prices on Various Steel Products

*Washington*

• • • OPA on July 20 announced new resale prices of bars, bar strip, billets, blooms, slabs, cold rolled strip, tubing, plates and sheets in four specifications of alloy steels, NE 8600 and 8700 and AISI 4100 and 3100. It was stated that this announcement was made to give resellers of iron and steel products, holders of excess stocks and purchasing agents a better understanding of how resale prices of these items are affected by a recent price adjustment made at the mill level in these four analyses of alloy steels.

Resale prices of alloy steels covered by RPS 49, are based upon the mill prices established by RPS 6. On July 14, OPA decreased the analysis extras on NE 8700 and 8600 steels $2 per ton, and increased those on AISI 4100 and 3100 steels $3 per ton. This adjustment at the mill level, accomplished by Amendment 10 to RPS 6, automatically affected resale prices on all deliveries of iron and steel products in these four analyses of alloy steels made on or after July 12 from both warehoused and non-warehoused stocks. The recent announcement explains the price adjustments at the resale level resulting from this action.

New Base Prices (per 100 lb)

| | Hot Rolled Bars | | Cold Finished Bars | |
|---|---|---|---|---|
| | Open Hearth | Electric Furnace | Open Hearth | Electric Furnace |
| NE 8600 | $5.60 | $6.40 | $6.65 | $7.50 |
| NE 8700 | 5.65 | 6.50 | 6.75 | 7.60 |
| AISI 4100 (mo. 15-25) | 5.65 | 6.50 | 6.75 | 7.60 |
| AISI 3100 | 5.90 | 6.75 | 7.00 | 7.85 |

To the above warehouse base prices (price at basing point plus spread) differentials for freight, quantity, quality and merchandising, size, cutting, and miscellaneous extras should be applied, when applicable, in the amount set forth in Appendix G tables of RPS 49.

**Bar Strip, Billets,** Blooms, Slabs, and Cold Rolled Strip in NE 8600 and 8700 and AISI 4100 and 3100 Alloy Series (Maximum Price Determined by Section 1306.159 (p) of RPS 49.

Decreased 15c. or 20c. per 100 lb. or $3 or $4 per ton, in NE series 8600 and 8700. To determine exact amount of decrease recompute base prices in accordance with formula set out in Section 1306. 159 (p) of RPS 49.

Increased 25c. per 100 lb. or $5 per ton in AISI series 4100 and 3100.

**Alloys in NE 8600** and 8700 and AISI 4100 and 3100 series in other forms than those listed above (such as Plates, Sheets, or Tubing).

No change.

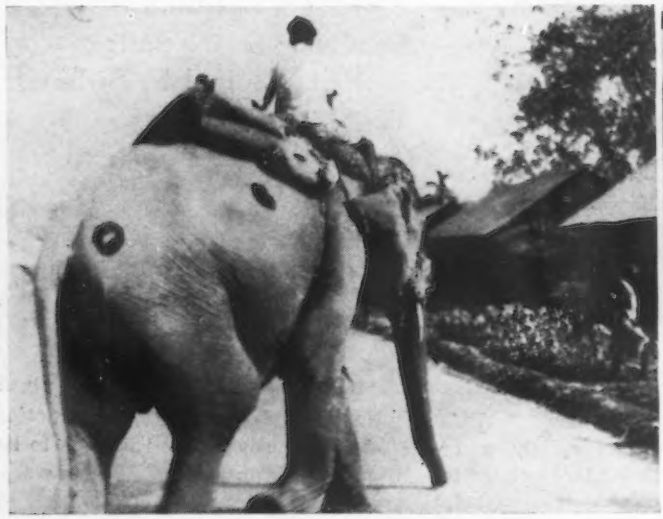
OPA said that in certain instances resale prices for products of these four alloy steel specifications cannot exceed the mill prices established by RPS 6 reflecting the price increases and decreases resulting from the July 12 action. This provision applies to sales by such resellers as brokers or intermediaries handling direct mill shipments and holders disposing of excess stocks of iron and steel products that they originally bought for their own use.

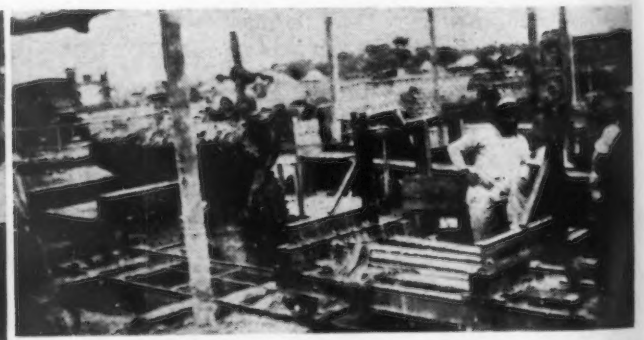
The resale prices that can be charged for the same products when sold from warehoused stocks by resellers such as warehousemen and jobbers are given at left.

## Cutler-Hammer Workers Given Wage Increase

*Milwaukee*

• • • **Decision in** the "biggest" case ever considered by the Sixth Regional War Labor Board recently gave 5519 production workers at Cutler-Hammer, Inc., Milwaukee, wage increases of four to six cents an hour. Material filed on the case, which was a joint application by the company and the International Association of Machinists (AFL), was several feet high and weighed more than 80 lb.





A STUDY IN PROGRESS: *The traditional carrying method (above) gives way to the American method of carrying supplies over the "hump" between India and China. An Army truck (upper right) has been disassembled for loading into a C-47 cargo plane for passage to China. At right, the C-47, with its load of supplies, including the Army truck, wings its way into China.*

## Over 1,073,000 Business "Deaths" Have Occurred Since Pearl Harbor

*New York*

• • • **Although 1,073,000** American business enterprises have closed their doors and only 572,000 new businesses have been organized in the two years following Pearl Harbor, there is actually no reason to be alarmed according to the Department of Commerce's "Survey of Current Business" received here recently.

In fact these figures, which show a decline of about 500,000 business concerns, do not necessarily mean that the effects of the war upon business have been at all adverse. It simply means, according to the publication, "that business turnover is always and normally of startling proportions."

In support of its conclusion, the survey states that in the two years prior to Pearl Harbor business discontinuances totaled 914,000 or five-sixths the number during the two years following our entry into the war.

"Indeed," the authors continue, "during the war period it was only in 1942 and the first quarter of 1943 that the rate of business discontinuances exceeded that of prewar years. During the last three quarters of 1943 the rate of discontinuances was strikingly lower than before the war.

"The decline in number of firms has not, on the whole, been accompanied by a similar decline in the profitability or volume of business. Although there have been notable exceptions, production, sales and profits in most lines—for small as well as large enterprises—have been maintained at a high level during the war.

"A large number of recent business deaths have been due, not to the fact that the economic forces of the war have driven entrepreneurs out of business, but that the owners have found attractive alternative opportunities in war industries or have been called into the armed service. The existence of lucrative employment opportunities and the operation of selective service have been more powerful as a deterrent to entry into business."

The survey adds that the wartime drop in number of operating concerns has been due as much to the decline in the rate of entry of new enterprises as to the increase in the rate of discontinuances. As a result of the near equality between business births and deaths in recent months, the business population is said to have again become relatively stable.

A very large part of the business turnover during the war has involved the smallest enterprises. This was said not to be surprising, for the rates of entry, exit and transfer normally vary inversely with the size of the concern. During the years 1942-43, concerns with fewer than four employees—comprising about 82 per cent of all enterprises—provided 95 per cent of all discontinuances, 91 per cent of all new businesses and 90 per cent of all transfers.

## Reveal New Markets For Air Conditioners After the War

*Philadelphia*

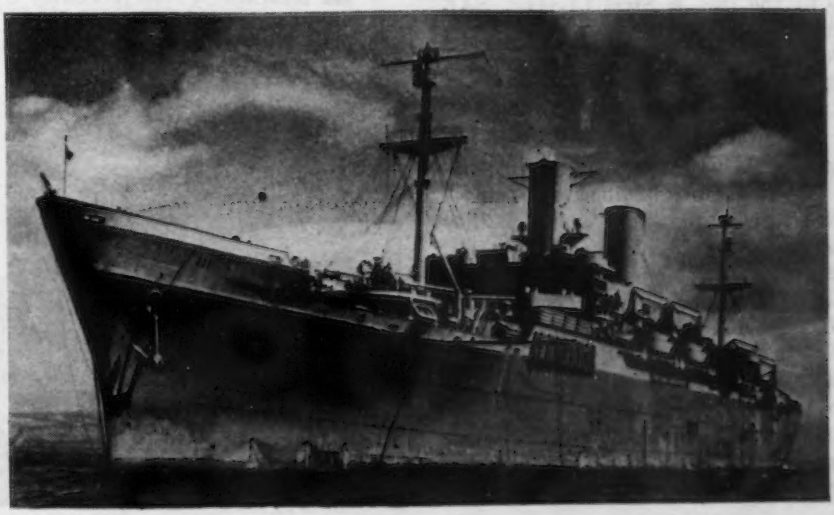
• • • **One of the important** and fast growing postwar industries is going to be single-room fractional horsepower air conditioners or room coolers, even though only five or six years ago practically nobody knew what they were, according to Harry Boyd Brown, manager of air conditioning for Philco Corp.

"The fact that very few people understood what a room cooler was, what it did or how it functioned was probably the chief reason the entire industry sold only 30,000 to 40,000 of these units a year before the war," Mr. Brown believes.

"But the performance, service and utility of single-room air conditioners have been so outstanding and so apparent to the user, that word of mouth advertising within the past few years has done a remarkable educational job insofar as the general public is concerned. The news about air conditioners has spread so rapidly that in the first postwar year; three times as many units will be made and sold as ever before, and it is not too radical a prophesy to say that three or four years after the war, annual volume should increase to six or eight times that of 1941. In that event the business might amount to $60,000,000 a year.

"Undoubtedly the postwar units will be lighter in weight, and therefore, even more easily installed. They will incorporate the new materials and processes that have been developed by war research. Along with all these things, Philco is planning to make and sell the units at lower prices, which should greatly increase the scope of the market and make them available to many more people than ever before."

**FRONT LINER:** *A super-troopship, built by U. S. Steel's Federal shipyard at Kearny, N. J., lies at anchor off an American port. This type of vessel has been on the Navy's secret list for months. Carrying three types of guns, the ship has terrific firepower.*



## Labor Situation in Canada Has Become Serious; Conditions Are Acute

*Toronto*

• • • **The labor situation** in Canada has reached serious proportions and is becoming more acute almost daily. At the beginning of the year many workers were seeking jobs whereas today there are thousands of jobs that are seeking workers. This condition has been brought about partly due to the thousands of workers that were employed when the revived shell production program went into effect about three months ago, together with the fact that call-up of men for Canada's home defence army is taking thousands of workers from their jobs each month.

Reports from across Canada indicate that practically all branches of industry are affected. Steel mills and war plants are making strong appeals for labor and are meeting with little success with the result that plant operations, while at full capacity to the extent of labor supply, are well below their rated equipment capacity. It is stated that base metal mines now are shorter of labor than at any time since the outbreak of war and as a result production has had to be reduced at a number of mines, in some instances as much at 25 per cent.

International Nickel Co., is carrying on production at the curtailed rate touched last year when two of the four blast furnaces at the Coniston smelter had to be closed down, and it is stated that a further cut may have to be made if the labor situation continues to deteriorate.

Announcement was made by Noranda Mines Ltd., one of Canada's major copper producers, last week that it had to cut off one of its two reverberatory furnaces and it is expected it will remain idle until November at least, and will cut output by 25 per cent. For some time it has been apparent that Noranda would be forced to curtail its daily tonnage. The management carried on hoping that conditions would improve but the lack of good and sufficient mining labor meant that finally all the preparatory development work became used up and therefore the usual tonnage could not be obtained.

Deyomac Mines Ltd. went into production last week and made its first shipment of fluorspar from its property in Madoc to one of the steel mills at Hamilton. Handicapped by labor shortage and in a position to operate only one crew, the company plans to produce and ship around 1200 tons of fluorspar between now and October 31, and has orders on hand that are well in excess of this production schedule. It is estimated that shipping grade will run about 70 per cent for which the prevailing price, f.o.b. Madoc is $30 per net ton.

## SAE Joins the AISI in Alloy Standards

*New York*

• • • **Tentative uniform** method of specifying alloy steels by hardenability to expedite wartime manufacture of weapons and armament and to conserve critical materials by facilitating selection and processing of steels on the basis of physical characteristics rather than chemical composition has been developed jointly by the Society of Automotive Engineers and the American Iron & Steel Institute.

The hardenability data are presented in a booklet, "Tentative Hardenability Bands," prepared cooperatively by the Iron & Steel Division, SAE Standards Committee; Iron & Steel Committee, SAE War Engineering Board; and Technical Committee on Alloy Steels, AISI.

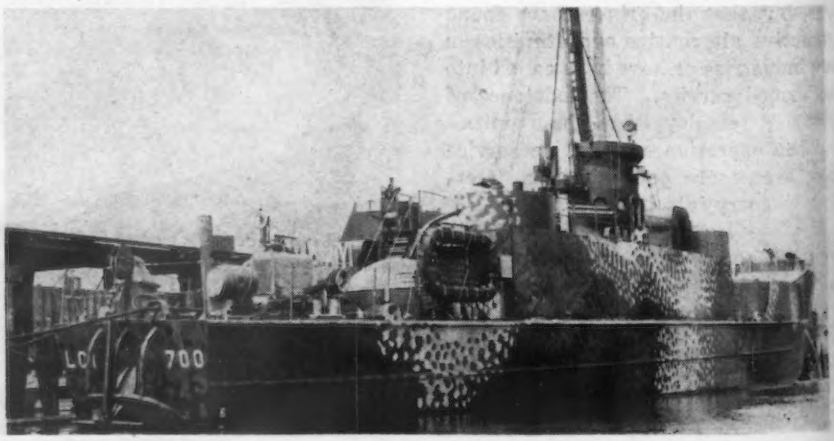
The uniform method currently is applicable only to 37 standard fine-grain steels of modified chemistries for which tentative hardenability bands have been published. The steels, identified by customary SAE and AISI numbers, plus the code letter "H," include 4100H from .30 to .50 carbon inclusive; 4340H; 4620H; and the 8600H and 8700H series from .20 to .50 carbon inclusive.

For other standard steels minimum hardenability requirements consistent with minimum chemical compositions are being prepared. These will apply until sufficient SAE standard end-quench hardenability test data for full bands become available from studies now under way.

The new method, characterized as epochal and destined to become widely used by design engineers and in metal-working industries, springs from an engineering philosophy of selecting steels on the basis of hardenability as an index of tensile strength, with only corollary reference to chemical compositions, enunciated at SAE meetings for some years. Subsequent to an SAE symposium on hardenability held in 1941 at Detroit, the SAE Iron & Steel Division developed a "Recommended Practice on Method of Determining Hardenability," which was published in the SAE 1942 Handbook.

When the long-recognized importance of tests for hardenability was emphasized by the exigencies of war production the two societies undertook cooperatively to collect and analyse the necessary test data.

**ONE-SHIFT ASSEMBLY:** *This LCI (L) boat, No. 7001, was recently constructed and launched by George Lawley & Son Corp., at Boston, in the record time of seven hours. Eight six-cylinder engines, in the form of "two quads," and built by Detroit Diesel Engine Division of General Motors, power the craft.*



# WPB Announces PEC Procedure For Handling Cutbacks; Adjustments

*Washington*

• • • **While emphasizing** that they are not now significant, the procedure by which the staff of the WPB Production Executive Committee will handle cutbacks and other production adjustments was announced last Thursday by Committee Vice-Chairman Arthur H. Bunker. He said that the procedure contemplates the least possible dislocation of employment and the greatest utilization of resources. The membership of the staff includes representatives of the War and Navy Departments, the Maritime Commission, various WPB sections, Smaller War Plants Corp. and WMC.

Mr. Bunker, director of the staff, in outlining the methods of PEC, said that the staff reviews every program cutback proposed by a procurement service involving a reduction of as much as $1,000,000 in the total value of the items to be delivered in the current month or in any one of the succeeding six months under all prime contracts for the same procurement item. In addition, the staff is notified of each change in any single outstanding contract which reduced the value of items to be delivered during the current month and succeeding three months by $200,000 or more. The $1,000,000 figure, Mr. Bunker pointed out, covers programs, which usually include several contracts, so that, in fact, the staff reviews many contracts under that amount, a test figure which will be reduced if necessary.

In the cases reviewed to date, Mr. Bunker said, only 23 per cent of the prime contractors were affected by the curtailments amounting to as much as a $1,000,000 monthly rate; more than 10 per cent were between $500,000 and $1,000,000; some 62 per cent were between $100,000 and $500,000 and about 5 per cent were under $100,000. While the contracts of $200,000 are not reviewed before the cutback is imposed by the procurement service, it was pointed out, the staff requires notification prior to the action, and so can move to place alternative work in the plant, to recruit any workers who may be freed and generally to take all possible steps to aid the affected contractor. The determination to cut back a particular program, the staff director said, is made by the procurement agencies, the Army, the Navy and the Maritime Commission, on the basis of changing military requirements.

Mr. Bunker continued:

"Information is furnished to all members of the staff. The information includes data on the service or bureau involved, the items involved, the units and value of products delivered previously and of those to be delivered under the adjusted program, the prime contractors, the subcontractors if known, probable effect on manpower, materials and space, together with any other pertinent facts which may be available.

"If more than one contractor is involved and the cutback doesn't cancel production of the entire item, the first task of the staff is to determine where the cutback should be placed among the various plants affected. Thus, generally, it may be more desirable to cut a plant in a tight labor area than in a loose one. Also, it is frequently more desirable to cut the less sufficient producer rather than the more expert one. However, no rigid formula is applicable.

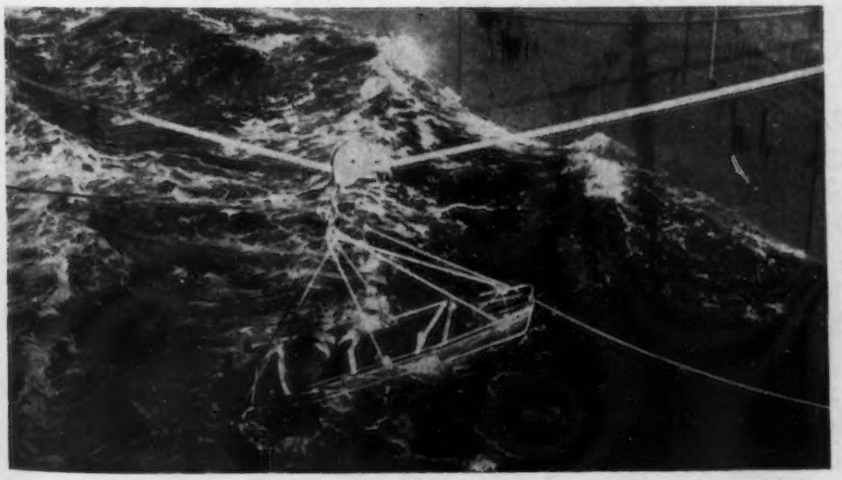
"In all cases in which it appears that the cut will release production resources, study is made by the staff's military subcommittee to determine whether the manpower and facilities involved can be employed for the manufacture of any other military item; whether the manpower released can be better employed at other war plants engaged in war production; or whether the facility must be left in a stand-by condition as an insurance for possible future increase in war production.

"Meanwhile, the various PEC staff representatives investigate the effects of the production adjustment upon materials, manpower and the possibilities of using any facilities which might be released for civilian production, if the procurement agencies do not need the facility for war uses. Of course, the PEC staff cannot itself provide civilian business. At the present time, it is possible to provide for increases in only the most essential of civilian production. When conditions permit the loosening of these restrictions, a primary responsibility of the staff will be to furnish information and otherwise assist various branches of WPB, WMC and SWPC to modify orders which now prevent material and manpower from being utilized for civilian production. The major initiative for starting civilian production will rest with private enterprise, guided by such restrictions as must be maintained to protect war production.

"When all available facts and opinions have been discussed, the PEC staff makes its findings, the contractor and workers are notified, the various government agencies involved in the field take over. The United States Employment Service of the WMC supplies recruiters if workers are to be released; the procurement agency, WPB, and, in the case of smaller plants, the SWPC, work together to do whatever is possible in connection with providing new business.

"The staff also arranges for handling of cases in such a way as to advise the contractor and the workers.

**SHIP SHUTTLE:** *A stricken seaman is shuttled over to a Coast Guard vessel for an emergency appendectomy at sea. A line is fired from ship to ship and the patient, snug in a litter, is passed through the air to the doctor.*



# General Motors Is Outraged By Union Demands for Sick Leave Bonus

***Detroit***

• • • **Exactly how little** the General Motors Corp. thinks of recent union demands for a twelve-day sick leave bonus has been summed up in a little pamphlet issued recently here by the corporation and entitled, "An Analysis of the Paid Sick Leave Plan for Hourly-Rated Factory Workers."

Full of interesting charts and quotations from insurance companies and government agencies, the little booklet beats its editorial breast against the evils of the proposal and the inadequacy of the union plan.

For instance, "the principle seems well established by industrial experience that if there is no financial loss to the individual from sickness, a very substantial proportion of any group of factory workers will be tempted to malinger, or at least to exaggerate their indispositions, with a resulting sharp increase in absenteeism," the booklet argues.

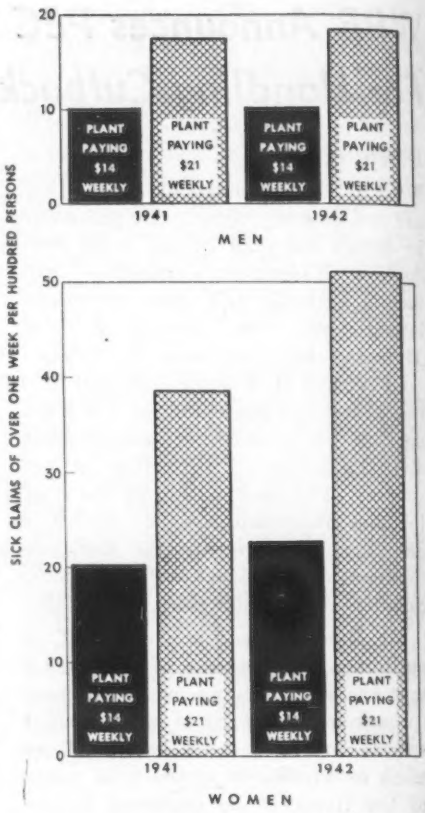
In support of this conclusion, General Motors compares one of its plants which pays $21 a week ($7 coming from a private plan) with another plant which pays the regular $14 a week sick benefit. Figures show that the plant paying $21 a week had a rate of absenteeism 70 per cent higher than the $14 a week plant. Look at the chart at right.

Moreover, General Motors doesn't think it should offer its workers "a temptation to malinger" and rebels against indemnifying for such miscellaneous non-industrial disabilities as "that tired feeling," "lame back," "run down condition," "nervous exhaustion," "melancholia," "dizziness," "nausea," and "hypochondria." For this, General Motors quotes E. O. Faulkner, in his book *Accident & Health Insurance*, p. 128, in which the author says "One of the few definite statements concerning moral hazard is that it increases with the amount of the indemnity."

Another objection found to the union proposal is the tremendous amount of police work that would be necessary to investigate cases of absenteeism due to sickness. It points out that "literally hundreds" of critically needed doctors and nurses would be needed to find out if a worker was really sick or just "taking a day off" for personal reasons.

The booklet explains that General Motors has always thought in terms of employee health. It recalls that the company has had an extensive medical program designed to aid in the protection of worker's health for many years. It says that the company offers its employees cash disability benefits, hospitalization, group insurance and other surgical attention and that more than 125 physicians and 500 nurses administer to the care of the workers daily. All this, the booklet adds, without charge to the worker.

Thus, the pamphlet concludes, the union's proposal would not only be bad for production but would also fail to protect any really important health hazard encountered by the workers. It would also cost a lot.




THIS CHART *shows how the benefit rate influences sick claim frequency among employees at two GM plants. Note increase in number of sick claims in plant paying the larger sick benefit.*

## South Forms Its Own Research Organization

***Birmingham, Ala.***

• • • **Patterned largely after** Mellon Institute of Industrial Research, a new organization providing laboratories and scientific skill and knowledge for the use of industry and agriculture in the South has been organized and is known as the Southern Research Institute.

The institution will engage in technical research on a contract basis. At present it has $400,000 for its implementation, all subscribed by business firms and individuals in the Southern region. The foundation fund before long is expected to reach $1,000,000.

Officers of the Southern Research Institute are: Chairman, Thomas W. Martin, president, Alabama Power Co.; vice-chairman, Wallace L. Caldwell, president, Alabama Asphaltic Limestone Co.; treasurer, Milton H. Fies, vice-president, De Bardeleben Coal Corp.; secretary, John A. Maguire, Birmingham, Ala.

## Pullman Co. to Dispose Of Sleeping Car Business

*Chicago*

• • • **Railroad car and** equipment manufacturing, as represented by Pullman-Standard Car Manufacturing Co., has won the nod over the sleeping car service of Pullman, Inc., in the company's action to carry out the requirements of the decree entered May 8 in the United States District Court at Philadelphia in the government's anti-trust against the Pullman group.

A plan to dispose of existing sleeping car equipment, an official statement issued by the company's directors, will be prepared and "submitted to the Court on or before Oct. 5, 1944, for aproval."

Reports have been current in the trade that at least one Eastern railroad has acquired all the Pullman parlor care operated on its own line.

The decision to dispose of the sleeping car business climaxes initiated by the government in July in 1940, when the Department of Justice filed similar action against the Pullman group of companies in which it charged that they constituted a monopoly in violation of the Sherman Anti-Trust act.

# Share the Steel Program Started By WPB; Covers Carbon Steel Users

*Cleveland*

• • • **A renovated share-the-steel plan,** similar to that of a year ago when excess CMP allotments were called in, is underway this week. WPB is circularizing some 70 steel consuming plants in this area and about 480 on a national basis, with a letter pointing out the immediate importance of reducing carbon steel inventories and outstanding orders to a minimum.

In addition to the letter, representatives of the WPB field offices will personally contact each firm and attempt to aid in the problem of determining which materials and orders could be safely dispensed with. The aim is to reduce all carbon steel inventories to a maximum of 60 days whether actually in inventory or on order and to reduce as many stocks as possible to a 30 to 45 day working level if this is feasible with the time lag of the end product.

Results are expected to show in cancellations of orders now placed on extended delivery promises from the mills and many immediately effective cancellations of material not yet in the finishing processes—a move aimed at lessening the load on the mills for third and fourth quarter delivery. No actual diversion of inventories from one consumer to another is anticipated.

Emphasizing the need for this move WPB points out that the backlog on steel mill order books has mounted from 1,300,000 tons in the fourth quarter of 1943 to an estimated 3,000,000 tons for the fourth quarter of this year. The success of the share-the-steel plan a year ago when all excess steel allotments were called in and redistributed has given impetus to this newest move. Redistribution of the tonnage now believed to be ordered in excess of actual need for safe working inventories is expected to greatly assist the now extremely tight steel situation. The mills say that if nothing more than a lessening of the overload on certain products is accomplished the effort will be well justified.

Results should show up quickly as compliance with the WPB request is required between July 24 and 29.

# Iron Ore Consumption Drops

*Cleveland*

• • • **Consumption of Lake Superior** iron ore during June amounted to 6,887,640 gross tons in the U. S. and 224,420 tons in Canada, making 7,112,060 gross tons as compared with 7,557,762 gross tons during May and 6,939,998 gross tons in June of last year, according to report of the Lake Superior Iron Ore Association.

Cumulative consumption to July 1 was 42,984,617 tons for the U. S. and 1,305,613 tons for Canada as compared with 42,854,418 tons and 1,238,302 tons for U. S. and Canada respectively for the same period of 1943. Cumulative totals were 44,290,230 tons for 1944 and 44,092,720 tons for 1943.

Ore on hand at furnaces and Lake Erie docks totaled 26,655,414 tons on July 1, 1944, as compared with 21,473,619 tons a month ago and 26,098,245 tons a year ago. There were 173 U. S. and seven Canadian furnaces in blast as compared with 170 U. S. and seven Canadian furnaces on June 1.

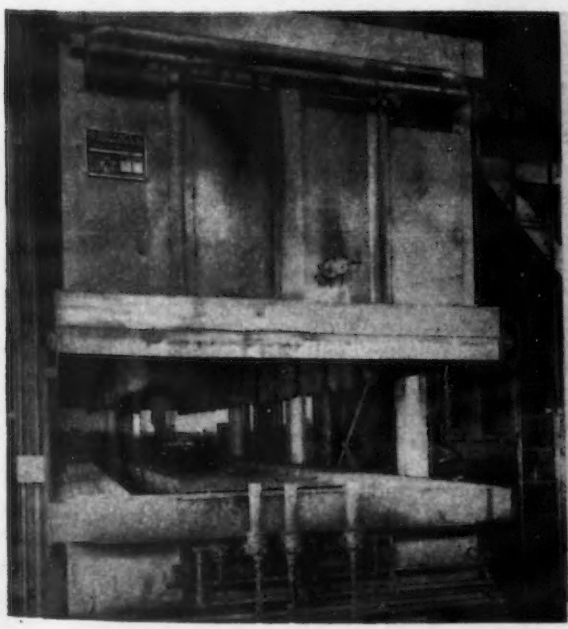
## Chevrolet Given Shell Order

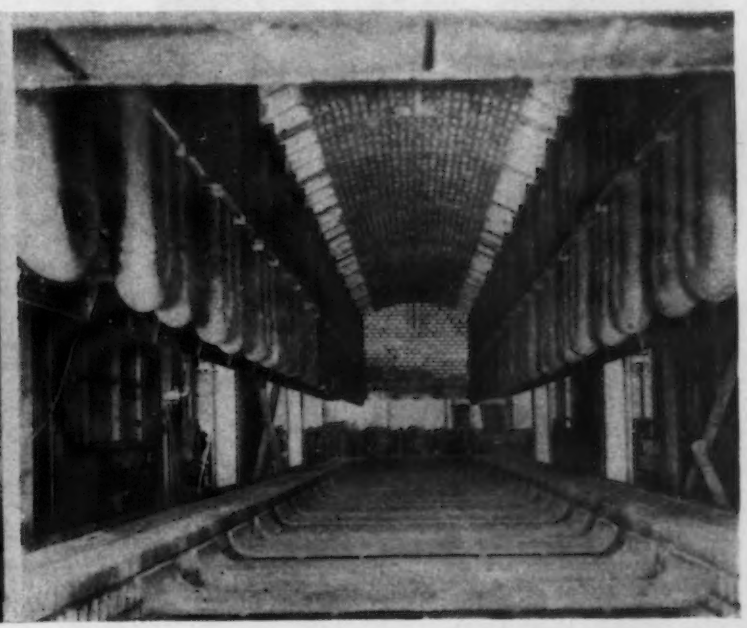
*Detroit*

• • • **Chevrolet Motor Div.** of General Motors Corp. has been given an order for manufacture of 105 mm. howitzer shells at the St. Louis ordnance plant.

Production will begin in Dec. and will reach a volume of $3,500,000 a month by next June. Chevrolet will purchase $12,000,000 in equipment and machinery for the job.

RADIANT TUBE FURNACE: *At right is the interior of a Surface Combustion lift-cover, ear-bottom furnace used for the heat treatment of high alloy rod and bar stock. The radiant tube heating elements are located along the sides of the lift cover, and extend below the work holding car when the cover is lowered. The prepared NX gas atmosphere provides a heat treated metal surface free from scale and decarburization. At left are shown more details of the lift-cover and mechanism.*





# Redistribution Plan Hitting Snags but None Appear Serious Now

*Cleveland*

• • • **The surplus redistribution** plan covering aircraft steels, aluminum and aircraft hardware formulated recently by the Metals Reserve Corp. and the Aircraft Scheduling Unit to utilize steel warehouses as sales agents for surplus stocks has hit some preliminary snags.

None of these is serious and the emergence of the plan into full activity should come within this quarter. The difficulties were experienced mainly through vagueness of certain clauses in the contracts offered by MRC to the warehouses. Since these are bona fide contracts many warehouses have reneged until the clauses are redrawn. This process is underway and the new MRC contracts should be available within the next 10 days. Only a few of the original contracts were accepted and these will be revised in accordance with the new concept.

Some contract difficulties occurred over a clause which required the warehouses to stock surplus material exclusively if the wanted items were available in surplus inventories. This stopped the warehouses which foresaw that one item out of several desired might be available from surplus but not the others thus blocking the way to grouping the several items to create a mill run if the balance of the material must be secured from a mill. This requirement is being dropped.

Another difficulty was that although the contract could be ended by notice on the part of either party, no provision was made requiring the MRC to remove the stock from the warehouse within a certain time. This is being changed to a 90 day limit.

Warehouses closest to the aircraft plants are being given first opportunity to take up these contracts but due to some differences of opinion over the boundary lines of territories there are still some minor problems to be ironed out.

Meanwhile the aircraft producers are being urged to prepare lists of inventories and get them filed with MRC so that once warehouses are placed under contract they may immediately inspect and take the consignment of the selected stocks. The inventory records are being handled under a standardized method using symbols to denote description of the material.

Considerable controversy still surrounds the weight limits which will be listed as surplus and that which will be lumped together and scrapped. Currently the limits set up in Army Procurement Reg. 7 are expected to be observed. This is expected to eliminate as many as 85 per cent of the number of individual listings but represents probably less than 10 per cent of the poundage involved.

The advantage of such a plan lies in the simplification of listings, the elimination of many of the cat and dog small lots, and the easing of the responsibility on contract termination officers in determining what shall be scrapped. Odd and small lots (within the regulation's terms) will be summarily scrapped by the aircraft firms before listing surpluses. Only the cream of the stocks and the usable lots will be recorded and offered for sale. The balance will be scrapped through dealers who will furnish an affidavit that no salvage of the material will be attempted.

New orders for aircraft materials are also expected to be screened against stock lists as a means of assuring use of available surplus in the majority of instances. This may relieve the mills somewhat and the buyer will suffer no handicap as sales will be consummated on a mill price basis except in the few instances where the warehouses actually purchase the stock (instead of taking on consignment). This would permit sale at regular warehouse prices.

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SLAP HAPPY JAP: *Two Leathernecks intern a Nip civilian at Saipan. While in hiding, this Jap had been withstanding the rigors of war with a bottle of saki and had a slight edge on when captured.*

o o o

## Plan to Convert Big Torpedo Plant after the War

*New York*

• • • **Postwar plans** of the American Can Co. call for establishment of one of the company's largest manufacturing units in St. Louis, D. W. Figgis, president of the company, announced here recently.

The new plant, originally intended for can manufacture but made available to the government for torpedo production during the war, will have more than 600,000 sq. ft. of floor space and will employ about 750 workers, it was said. Peacetime production at this plant is expected to supply the needs of the Ozark area canners and also the requirements of the oil industry in the Tulsa district.

An older plant at St. Louis, now in operation but which has only about one-sixth of the new plant's capacity, will be abandoned after the war, and the production and personnel absorbed by the new plant, it is expected. The older plant, located at Branch and Hall Street, is now manufacturing fibre bodied paint cans, spice cans and baby food cans and is also making insecticide cans and cans for antiseptics and dehydrated vegetables.

# WLB Decisions Indicate Unrest Between Plant Workers and Producers

*Chicago*

• • • **Decisions** of the sixth regional War Labor Board last week indicated that labor unrest caused by inequalities between war plant workers and producers of civilian items has by no means come to an end despite the fact that war production is believed by many to be past its peak.

In a dispute between the International Harvester Co., McCormick Works, Chicago, and the United Farm Equipment and Metal Workers of America, involving 4500 workers, the board denied the union's request for a general wage increase. The company and union were ordered to negotiate for 30 days on existence of intra-plant inequities between the torpedo plant and farm equipment plant and to report back to the board at the end of that period their respective contentions concerning inequities still in dispute. The parties were also directed to negotiate on specific instances of improperly established job classifications. It was ordered that women be paid 77c. an hr. starting rate when hired and the six weeks beginning period eliminated, this rate retroactive to November, 1942. Industry and labor members dissented on various sections of the order.

The Institute of Scrap Iron and Steel, Chicago Chapter and Machinery Scrap Iron and Metal Teamsters, Chauffeurs and Helpers Union, Local 714, who had jointly applied for a higher wage rate in order to attract labor were partially rewarded. Rates were approved which will maintain the common wage rate at 65c. an hr. and raise the rate for yard shear pressmen from 70 to 80c. an hr., torchmen from 75 to 85c. an hr. outside truck drivers from 75 to 85c. an hr.

One week's vacation after one year's service based on a 48-hr. week was approved. The new arrangements are retroactive to May 1, 1944.

Approval also was given to a joint application of company and union for a raise in rates at the Harrison Sheet Steel Co., Chicago, effective May 31, 1944. An increase of two and one-half cents an hr. in all classifications will be given.

The board denied an application by Silver Steel Castings Co., Chicago, for review of a decision of March 24 which ordered maintenance of membership, checkoff, and a vacation program. This order was in the nature of a review by the national board of the local board's findings.

## U. S. Steel Sets Records

*New York*

• • • **Shipments** of 10,632,854 net tons of finished steel products by subsidiary companies of United States Steel Corp. for the first six months of 1944 were the highest on record for the period. Shipments for June, 1944, were as follows: June, 1944, 1,737,769 net tons.

The June shipments compare with 1,776,934 net tons in the preceding month (May), a decrease of 39,165 net tons, and with 1,552,663 net tons in the corresponding month in 1943 (June), an increase of 185,106 net tons.

For the first six months of 1944, shipments were 10,632,854 net tons compared with 10,040,016 net tons in the comparable period of 1943, an increase of 592,838 net tons.

The previous record for first six months' shipments, 10,503,507 net tons, was established in 1942.

# An American Weapon Carrier Now Produced by Ford

***Somerville, Mass.***

• • • **The Ford Motor Co.** branch plant here has been in production, it can now be said, on a weapon carrier similar to the British Bren gun carrier. Many thousands of these vehicles have been built and exported to the British under Lend-Lease.

The American-built universal carrier resembles the British model in general appearance, but is different in many respects. A welded steel hull is used, rather than the riveted British type. A 100 hp. Mercury engine fitted with a special Holley Lincoln automobile carburetor powers the job. It has a low silhouette, and carries a crew of four, with radio, tools and stowage. The powerplant is mounted at the rear.

These carriers are prepared for the installation of two Bren guns, two Lee-Enfield rifles and two sub-machine guns in the rear, a platform for a 2-in. mortar in the left side front, and a rack for a Boys armor-piercing 50-caliber rifle. The tracks are short pitch malleable steel, an alloy developed by Ford metallurgists.

UNIVERSAL CARRIERS: *Light armored machines designed to carry machine gun and mortar crews into frontline action roll out of the Ford Motor Co. plant at Somerville, Mass. These land-water-mud vehicles are built with low silhouette to escape enemy bullets.*

## Copper Division to Handle Parts for Completed Wire, Cable

*Washington*

• • • **WPB officials have** informed the Copper Wire and Cable Industry Advisory Committee that all component parts going into completed wire and cable will now be handled by the Copper Division, which has been made a claimant agency. The division will be responsible for representing the wire and cable industry in conjunction with other industry and material divisions on such products as steel, cotton, polyvinyl chloride and other materials going into finished copper wire and cable.

WPB explained that the supply of components is tight, but that additional capacity for some elements may soon be provided and delivery of others may be assured by direction. It was predicted that based on the present order pattern, third-quarter requirements for copper wire and cable will exceed the productive capacity of the industry.

Tight supplies of materials and facilities have necessitated directives to all copper wire mill warehouses and all copper wire mills, establishing a quota limiting the shipments on "V-3" orders to consumers, dealers and repairmen operating under CMP Regulation No. 9, a Copper Division official said. As a result, more copper wire mill products will directly serve the war effort, he indicated.

## See World's Largest Coal Producer

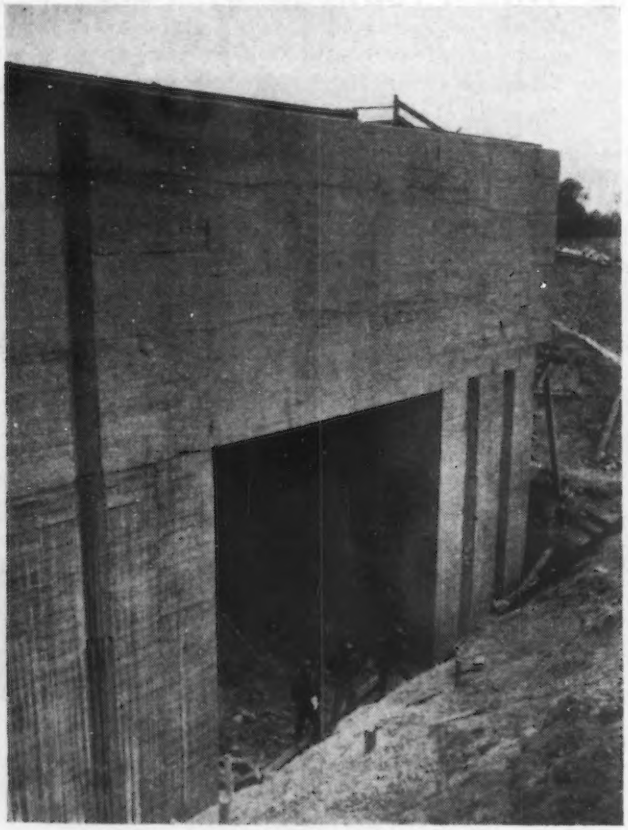
*Pittsburgh*

• • • **Expected to be when** completed the largest bituminous coal producer in the world, the new Robena mine of U. S. Steel's H. C. Frick Coke Co., is now delivering coal at the rate of 4000 tons a day. The new mine, located in Greene County, Pa., is described in detail in the current issue of *US Steel News*. When fully developed, it is expected to have a daily output of 20,000 tons of metallurgically washed coal.

The preparation of the underground network of "headings" accounts for most of the present production, and this coal is all being delivered to the Ronco mine tipple about three miles up the Monongahela, through twin tunnels passing under the river into the Fayette County operations.

The Colvin shaft located 2.6 miles from the river will probably be ready for operation in August. This mine service shaft will serve as a means of entry for the men into the mine, for disposal of slate and will give passageway for part of the mine's fresh air supply. Most of the mine's service, repair and maintenance facilities are concentrated at the Colvin Shaft site.

At the river, the piers for the Robena docks have already been constructed, but the group of buildings including the tipple, washer and mixer are not expected to be completed for at least a year and a half. By that time, two additional service shafts will have been sunk and put in operation.



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ROCKET BASE? *Yanks inspect a huge 130 ft. long concrete tunnel captured from the Nazis near the Normandy coast. It is 22 ft high, 22 ft. wide and 16 ft. thick. It is believed that the Nazis had planned to use it as a launching base for flying bombs.*

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## Will Still Restrict Steel For Visible Record Equipment

*Washington*

• • • **Restrictions on** the use of steel for visible record equipment cannot be relaxed in the near future, WPB has advised the Visible Record Industry Advisory Committee. The supply of steel for civilian production is extremely limited because of increased military requirements, WPB officials explained. They suggested that some steel might be available from idle and excess inventory. The possibility of substituting aluminum for steel was also suggested by WPB representatives. Under the aluminum order (M-1-i) as amended July 15, manufacturers were permitted to substitute aluminum for any other metal the use of which is now permitted.

## Discovers New Use For Aircraft De-icers

*Akron*

• • • **What's good for attaching** de-icers to airplanes is also good for fastening straps to portable radio sets, a Chicago radio manufacturer discovered recently.

Experimenting with the rivnut, one-piece combination rivet and nut plate originally developed by the B. F. Goodrich Co., for use in its de-icer installations, the manufacturer found that when the straps were attached with rivnuts his radio sets became waterproof, could be completely submerged without any water seeping into the set. He is making a study to find further possibilities for their use.

# WPB Has Removed Restrictions On 26 Types Construction Equipment

*Washington*

• • • **Reflecting** an easing in the supply situation for certain items, WPB on Monday removed restrictions on the sale of 26 types of construction equipment and made other changes to decrease paper work in the administration of L-192, which controls the manufacture and distribution of construction machinery and equipment and repair parts. WPB said that no increase in total volume of production is anticipated. The 26 types of equipment were transferred from schedule A to schedule B. Items listed in schedule A may be sold to war agencies without restrictions and to other purchasers only upon specific authorization. One item—carrying and hauling scrapers with more than 15 cu. ft. capacity—was removed from schedule D, which lists items that may not be manufactured. These scrapers are now included in schedule A. WPB said that the change was made to take care of a growing demand for larger scrapers in mining operations.

Items listed in schedule B may be sold only on orders rated AA-5 or better. This provision is effective Aug. 3. Formerly, L-192 imposed no rating restrictions on these item. Production schedules for B items, formerly required once a month, are now filled on a quarterly basis.

The schedules will show the rating pattern of the producer's deliveries for the previous quarter and his planned production in total units for future quarters. The information will enable the construction machinery division to coordinate authorized production with the quarterly allotments of controlled materials, tires and lumber.

Provisions governing the manufacture and sale of repair parts for items in schedule A remain substantially unchanged, except that export purchase orders for repair parts amounting to less than $100 are now exempt from the necessity of obtaining specific WPB authorization. The exemption formerly covered only orders amounting to less than $50. Though the dollar volume of export orders under $100 is not very great, the number of such sales is large, WPB officials said. All restrictions on the distribution of repair parts for B items have been removed since the supply of these parts is reported adequate.

The order specifically states that production of both schedule A and schedule B items will be authorized so that labor requirements in any plant will not interfere with war production in that plant or in any other plant in the same area. In approving a producer's total production of equipment for non-military use, WPB may consider a producer's total production of a particular type of equipment during the years 1937-1941. Other factors, including the availability of materials and components, also will be considered.

Construction equipment controlled by the order is at present produced by approximately 300 manufacturers, WPB said. In 1937, the peak year for pre-war production, sales of all items covered by L-192 amounted to approximately $247,000,000. Sales in 1943 totaled about $721,000,000. It is expected that the 1944 rate of production will be about the same as that for 1943, WPB said.

Approximately 73 per cent by dollar value of total current production is used for the military services; five per cent is used for export, and 22 per cent for essential civilian requirements.

The 26 types of equipment that have been transferred from schedule A to schedule B are: Angledozers and modifications for mounting on tractors of 25 drawbar hp. or less; concrete handling chutes; concrete surfacing machines, highway type; construction material conveyors; portable belt type and for portable plants; contractors' and material handling derricks, guy and stiff leg stationary type; road discs, wheel mounted and harrow type for construction work; blade ditchers; rock drilling machines and modifications, hand held or portable mounted except electric coal and core drills; self-propelled fine-graders and subgraders; finishers and rodding machines for wet concrete; concrete road forms; graders, under truck type; grapples, rock types; pile hammers; portable concrete hoppers; aggregate pulverizer mixers; cable-laying plows; snow plows for mounting on tractors of 25 hp. or less; road rippers; rollers, tamping and sheepsfoot; scarifier, complete machines, not attachments; concrete placing and material elevating towers and logging wagons, wheel type.

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GERMAN SUB PEN: *A Yank takes a picture from the top of an unfinished Nazi submarine pen on the docks at Cherbourg, France. Note massive concrete and steel reinforced construction of a pen that was never used against the Allies.*

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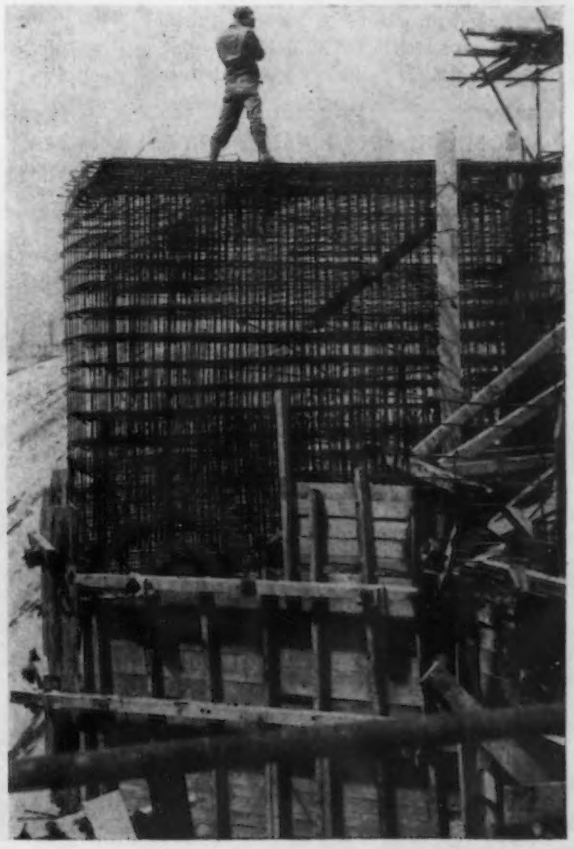


# Highest Job Referral Level Goes to Steel Castings Industry

*Washington*

• • • **Shifting of high** urgency requirements to Army tanks and components has brought the steel castings industry to the highest job referral level in those areas producing this material, the steel castings industry advisory committee was informed at its recent meeting, WPB reported.

H. L. Leyda, industry specialist of the WMC, pointed out that 74 steel foundries are now represented on the new certified list of the foundry and forge shops. He described operations and functions of the Area Production Urgency Committees and Area Manpower Priority Committees in aiding foundries to obtain manpower and maintain production.

Industry members expressed a desire to have their foundries placed on the production executive committee list, in order to obtain better labor priorities and speedier placements for their firms. This action followed a WPB official's announcement that a new, proposed form of manpower certification is soon to be circulated throughout the industry, seeking to accumulate data which will determine whether certain plants are producing castings of sufficient importance for high rated programs to justify special special treatment by WMC.

The committee deplored recent publicity describing foundry employment as "hot, dirty and onerous." The work in certain foundry operations is neither too heavy nor too disagreeable even for women workers, it was pointed out by several members. As a further refutation, Mr. Leyda cited WMC records which show that women workers constitute 9.6 per cent employmen in the 74 foundries mentioned. He also announced that the WMC will soon release information to prove that some foundry work can be performed by women.

Absenteeism was stressed as the worst problem in the steel castings industry at present, even on days when time-and-one-half or double-time wages were paid, several members reported.

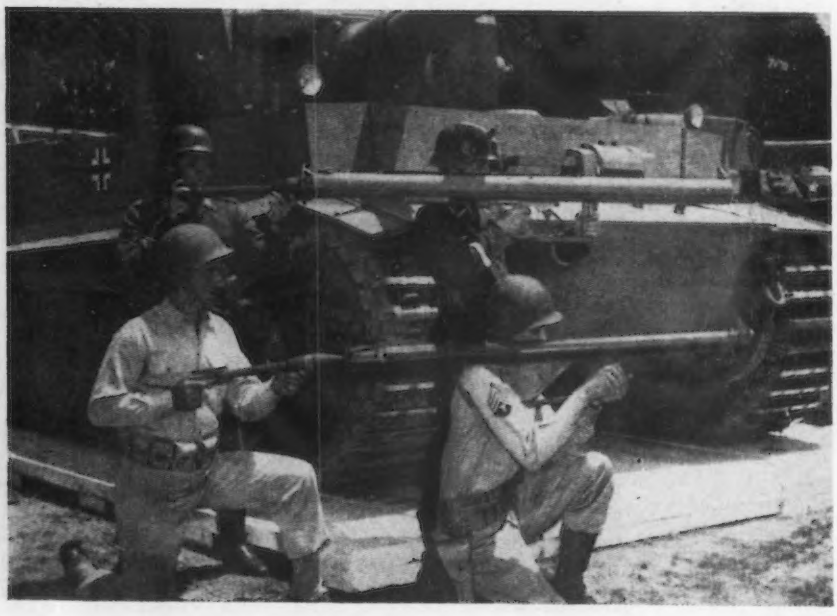
## Expect 30% Cut in War Production After Nazi Defeat

*Washington*

• • • **A 30 per cent cut** in war production is being planned by the high command upon the surrender of Germany. This means that the present rate of war output of $5,500,000,000 a month will be cut to about $3,000,000,000.

While this overall cut will be reflected in steel production by a similar percentage at least, the actual impact on industry operating rate is said to be unpredictable because of the size of inventories. Steel division officials have estimated that inventories held by consumers are at least 15,000,000 tons. Individual programs may be cut back more than 30 per cent and the force of terminations will very likely vary from state to state depending upon industrial location.

A COMPARISON: *A Nazi 88-mm. rocket launcher is shown with the American bazooka (below) in front of a captured German Mark VI Tiger tank somewhere in France. It is obvious that the Nazi weapon, although somewhat larger, is a copy of the earlier developed American weapon.*



## GPO E-5-a Amended to Add Planer and Shaper Gages

*Washington*

• • • **Planer and shaper gages** and hardened steel squares have been added by WPB to Exhibit A attached to General Preference Order E-5-a. Exhibit A lists the types of tools governed by the order. These items were omitted through oversight from Exhibit A when the order was amended June 6, WPB said.

## Extruded Metals Corp. To Resume Operations Shortly

*Grand Rapids, Mich.*

• • • **John L. Barrett,** president of Extruded Metals, Inc., Belding, Mich., said that the $6,000,000 Extruded Metals Defense Corp. plant at Grand Rapids will resume operation shortly.

Barrett, whose company manages the Grand Rapids plant, said production there would be devoted to the development of brass. About 700 workers will be employed.

## Lee H. Hill Appointed To War Labor Board Recently

*Washington*

• • • **Lee H. Hill** of Milwaukee, vice president of the Allis-Chalmers Mfg. Co., has been appointed by President Roosevelt as an alternate industry member of the War Labor Board, replacing George K. Batt, vice president and manager of Dugan Bros., New York. Because of his election as mayor of Montclair, N. J., Mr. Batt will serve only as a substitute member of the board.

Mr. Hill has served as a substitute industry WLB member and as a member of the board committees.

## Multi-Activity Plants Favored

*Washington*

• • • **WPB last week** pointed out that plants engaged in more than one activity may use the preference rating assigned under CMP Regulation 5 for their activities.

# Industry Gets Green Light On Experimental Model Production

*Washington*

• • • **Industry may make** experimental models ranging from the simplest item of manufacture to the most expensive and complicated under rules made public by WPB last Saturday. No experimental work is to interfere with war production.

Any model costing less than $5000 a month does not need special WPB approval to be made. Regional offices must OK production plans for models exceeding $5000 a month in direct costs such as materials components, sub-assemblies, labor, designing and drafting.

To assure that production of experimenal models does not interfere with output of war and essential civilian goods, WPB has provided, in addition to the requirement that labor and manpower may not be diverted, that:

1. Only the minimum number and minimum size of models necessary to prove the suitability of the article for commercial production or use may be made. This does not permit trial production runs of experimental models.

2. Materials made available specifically for another purpose may not be used to make experimental models.

3. Models may not be distributed to promote sales or create demand, and shall not be displayed to the trade or the public. Production of samples is specifically prohibited.

4. Models of houses, buildings or structures involving construction may not be made under the rules. Experimental construction jobs will continue to be governed by provisions of Order L-41.

## New Company Acquires Property of Rotary Electric

*Detroit*

• • • **A new company,** Rotary Electric Steel Co. of Delaware, has been chartered to acquire assets, business, inventories and properties of Rotary Electric Steel Co., of California, which operates electric steel furnaces at Detroit.

The assets of the Detroit company were announced last October as having been purchased by Atlas Corp., New York investing concern, but indications were that this deal was not entirely completed.

The newly chartered company has filed a registration statement with the Securities Exchange Commission covering 150,000 shares of $10 value common stock, reported sold for $11.37½ per share to an underwriting group headed by W. E. Hutton & Co. This stock will be offered publicly later.

The company has also sold $800,000 in five year notes and $500,000 in first mortgage bonds.

## Collins Heads Superior Steel

*Pittsburgh*

• • • **Carl I. Collins** was elected president of Superior Steel Corp. on Monday to succeed the late Frank R. Frost. Mr. Collins came to Superior early in June as executive vice-president and director of the company.

He had been executive vice-president of Wickwire Spencer Steel Corp. from 1942 until coming with Superior. Prior to 1940 he had been associated with the American Steel & Wire Co., and Atlanta Steel Co.

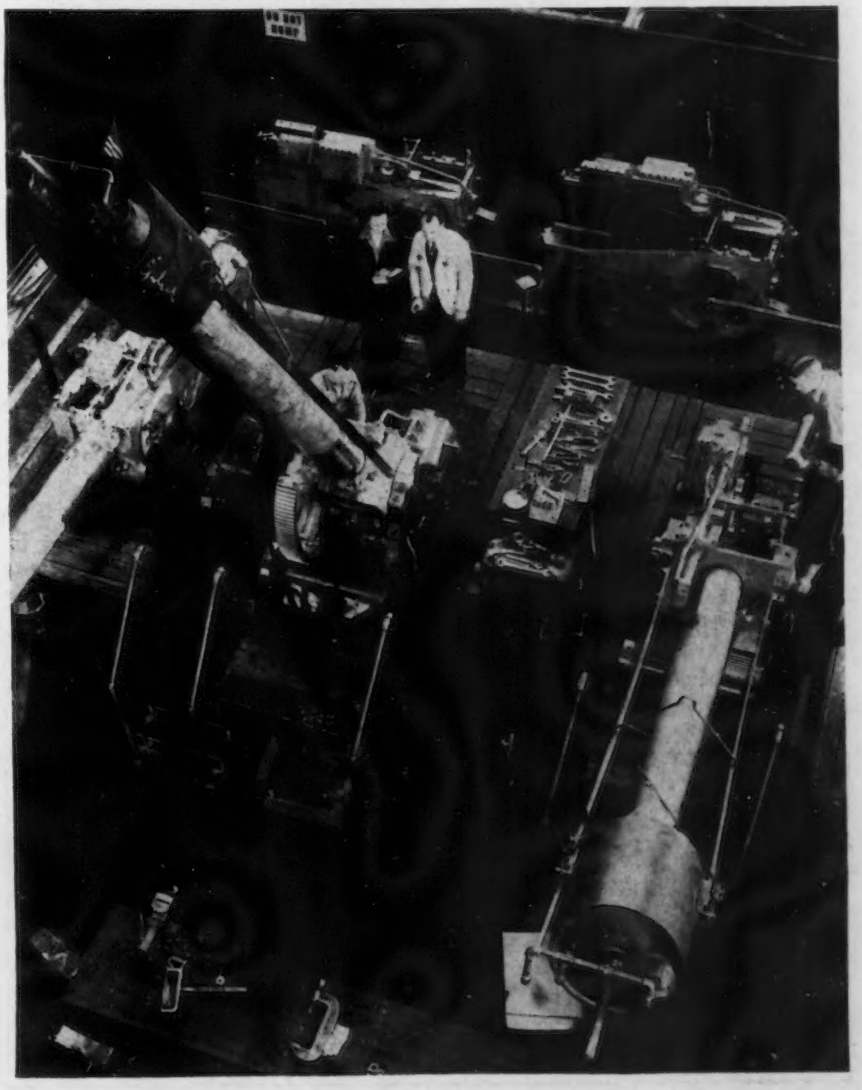
## Continental Sales Up

*Kokomo, Indiana*

• • • **Sales by Continental** Steel Corp. for the first half of 1944 totalled $11,132,263.28 compared to $11,042,425.76 for the first half of 1943 financial statement as of June 30 shows.

For the half year, net profit was $323,379.50 or $1.61 a share, compared with $334,338.02 or $1.49 a share for the same period of 1943.

GUN INSPECTION: *Naval inspectors at the U. S. Naval Ordnance Plant of the Westinghouse Electric & Mfg. Co. observe the recoil action of these 5 in. guns with the aid of a barrel-like device fitted over the muzzle. On the firing range, this action would be too fast to observe.*



# Bethlehem to Operate New Shell Plant

*Johnstown, Pa.*

• • • **The Pennsylvania** Department of Commerce announced this week that preliminary construction work has started on a $4,000,000 plant at Johnstown, which will be operated by Bethlehem Steel Co., under lease from the government, to produce 8-in. shells. Production is expected to begin some time around the beginning of next year. The new plant site adjoins part of the present Bethlehem facilities in Johnstown.

Another company that is taking part in the present expanded program for production of heavy artillery shells is Edward G. Budd Mfg. Co., which holds contracts for shells running into several millions of dollars and will be in production after retooling, which is expected to take several months.

## Disposal of Surpluses Outlined in Recent Book

*New York*

• • • **The cancellation of** war contracts and the disposal of government owned plants and surpluses is treated in broad outline in the book by A. D. H. Kaplan—"The Liquidation of War Production," published by McGraw-Hill Book Co., priced at $1.50.

Expected surpluses in the field of consumers' goods is of such magnitude as to represent in some specific line often a year's normal production of the given commodity. The author points out that in such a situation it will be necessary to reach out to heretofore untapped incomes in this country or to consumers abroad, otherwise "controlled sales methods will have to be developed, preferably after consultation with the industry."

Where the high original cost of certain large war plants involved the provision of community facilities around them, peacetime operation would require subsidies to enable them to compete with more favorably situated establishments. Under such condition, the author sees that "scrapping the plant may be the only way to avoid continuous political battling."

Experiences after World War I are recalled when, because of the lack of adequate warehousing space, large quantities of consumer's goods spoiled, and durable goods were allowed to rust or otherwise deteriorate. Here again, according to Mr. Kaplan, prompt disposal to consumers would be the surer method.

## New Marketers Book Out

*Cleveland*

• • • **The Postwar Planning** Committee of the Industrial Marketers of Cleveland, Chapter of the National Industrial Advertisers Association, is offering for sale the book "How to Find Markets and Influential Buyers," which is available for $1. This is the first of a series published for the aid of advertising managers, sales promotion managers and sales managers in solving their marketing problems.

## New Lubrication Booklet

*Cleveland*

• • • **How centralized** lubrication systems increase the production output of machinery and at the same time make impressive savings in time, power and lubricating materials, is the theme of Bulletin No. 25, newly published by The Farval Corp. here.

The 16-page booklet, printed in three colors, is a graphic portrayal of the theory and practice of mechanical lubrication. It is a study of the machinery lubrication problem and of the economies that are inherent in a system which delivers lubricant to all bearings in exact measured amounts regardless of location. This information is faced by a large close-up of a Farval.

## Mason Britton Appointed SWPA Assistant Administrator

*Washington*

• • • **Recently made** director of the Machine Tool Division of the Surplus War Property Administration, Mason Britton, former vice-chairman of the McGraw-Hill Publishing Co., recently was appointed as assistant administrator of SWPA. In announcing the appointment W. L. Clayton, Surplus War Property Administrator, said Mr. Britton's duties henceforth will relate to the general supervision of the disposal of all types of surplus property for which RFC is the disposal agency — surplus industrial plants, aircraft, machine tools and industrial equipment, chemicals, metals and minerals and other capital and producers' goods.

## New Institute Officials

*New York*

• • • **The following executives** have been elected to membership in the Controllers Institute of America: George W. Knox, assistant treasurer and controller of The Phoenix Iron Company, Phoenixville, Penna.; Carl H. Laun, controller of the Taylor Forge & Pipe Works, Cicero, Ill.; Kenneth E. Paxson, controller of The Upson-Walton Co., Cleveland; and Laurence D. Luey, controller of the Connors Steel Co., Birmingham.

The Institute is a technical and professional organization of controllers devoted to improvement of controllership procedure.

## Macauley Heads Auto Council

*Detroit*

• • • **The Automobile Council** for War Production at a recent election re-elected Alvan Macauley of the Packard Motor Car Co. as president of the council. He has headed this organization since its inception soon after Pearl Harbor.

Others re-elected to various posts in the council are: C. W. Avery, Murray Corp. of America; R. F. Black, White Motor Co.; C. C. Carlton, Motor Wheel Corp.; and P. G. Hoffman, the Studebaker Corp., as vice presidents; G. W. Mason, Nash-Kelvinator Corp., treasurer, and J. W. Anderson, Anderson Co., secretary.

## COMING EVENTS

Oct. 5-7—SAE National aircraft engineering & production meeting, Los Angeles.

Oct. 5-6—AIME Electric furnace steel conference, Pittsburgh.

Oct. 10-11—Gray Iron Founders' Society, Inc., Cincinnati.

Oct. 12-14—The Electrochemical Society, Inc., Buffalo.

Oct. 16-18—AIME Fall meeting, iron and steel division, Cleveland.

Oct. 16-20—American Society for Metals, Cleveland.

Nov. 2-3—Industrial Management Society, National Time and Motion Study Clinic, Chicago.

Nov. 27-Dec. 2—National Exposition of Power and Mechanical Engineering, New York.

Dec. 4-6—SAE National air cargo meeting, Chicago.


## If you need MACHINING FACILITIES . . .

. . . the large machining and turning equipment and personnel of the Barium Steel Shops are now available for your work . . . and the harder the job, the more we welcome the opportunity to serve you.

Under Barium *Unified Control*, of course, you may also use our forging, heat-treating, melting and laboratory services — one or all, according to your requirements.

**Forging Facilities** include 1500-ton and 1000-ton presses for heavy work and steam forging hammers up to 12,000-pound capacities for flat die work.

**Melting Facilities** consist of several open hearth furnaces up to 35 tons in size . . . now melting and meeting all analyses of carbon and a range of alloy steels to the critical tests of United States Government and airplane industry specifications. We are pouring ingot sizes up to 42" diameter, and 40,000 lbs. in weight.

**Heat-Treating and Annealing** furnaces of the most modern type are also available — and a well-equipped CHEMICAL AND METALLURGICAL LABORATORY.

Our *Unified Control* Service is available to you in whole or in part. Please send us your inquiries.

**BARIUM**
**STEEL CORPORATION**
*Producers of Carbon, Alloy and Stainless Steels . Heavy Forgings*
**CANTON . OHIO**

## Greenhill Made Chief Pressed Metals Group At Philadelphia Meet

***Philadelphia***

• • • **Election of the** following officers at a meeting of the Pressed Metal Institute held in Philadelphia recently was announced: F. C. Greenhill, vice-president of the Acklin Stamping Co., Toledo, Ohio, was elected president of the institute, succeeding the retiring president, George E. Whitlock, president of Mullins Mfg. Co., Salem, Ohio.

J. H. Robins, president of the American Pulley Co., Philadelphia, was elected first vice-president of the institute, and Tom J. Smith, Jr., of Cleveland, Ohio, and Huntington, W. Va., was appointed executive vice-president. Three new trustees were also qualified: C. W. Custer, The American Stamping Co., Cleveland, Ohio, chairman of the Cleveland district, C. W. Cederberg, Larson Tool & Stamping Co., Attleboro, Mass., chairman of the New England district, and V. S. Morrison, Morrison Steel Products, Buffalo, N. Y., chairman of the New York State district. District chairmen are representatives of their districts by institute constitutional procedure.

Progress of the institute was reviewed and the trustees were unanimous in the opinion that the institute

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THE WEASEL: *A low-slung, square-faced personnel and supply carrier, capable of operating over snow, deep mud, sand or on paved highways, goes into its routine at a Southern Army base. This radical war vehicle, dubbed "the weasel," is produced by the Studebaker factory in South Bend, Ind.*

is making a very substantial contribution to the stamping industry, and that it will play a conspicious part in the pressed metal industry in the post-war period. It was pointed out that membership already embraces representative concerns from coast to coast and is growing steadily both in influence and in numbers. It was stated by Mr. Greenhill, on the basis of progress achieved in the past fifteen months, that the desirability of a strong industry association has been fully demonstrated.

Accomplishments of the national organization during the past year that were highlighted at the trustees' meeting included cooperation extended to the Army and Navy in obtaining speedy action in locating sources of stampings. It was stated that 120 different inquiries for stampings have been referred to the industry for action since January 1. Also, results of the educational campaign conducted by the institute to inform manufacturers, designers, engineers and others concerning the wide range of new developments and techniques in the pressed metal industry were emphasized. This effort has been distinctly worthwhile in the opinion of the trustees, and it was unanimously decided to continue and expand educational activities.

## Pullman Standard Increases Heavy Ordnance Schedules

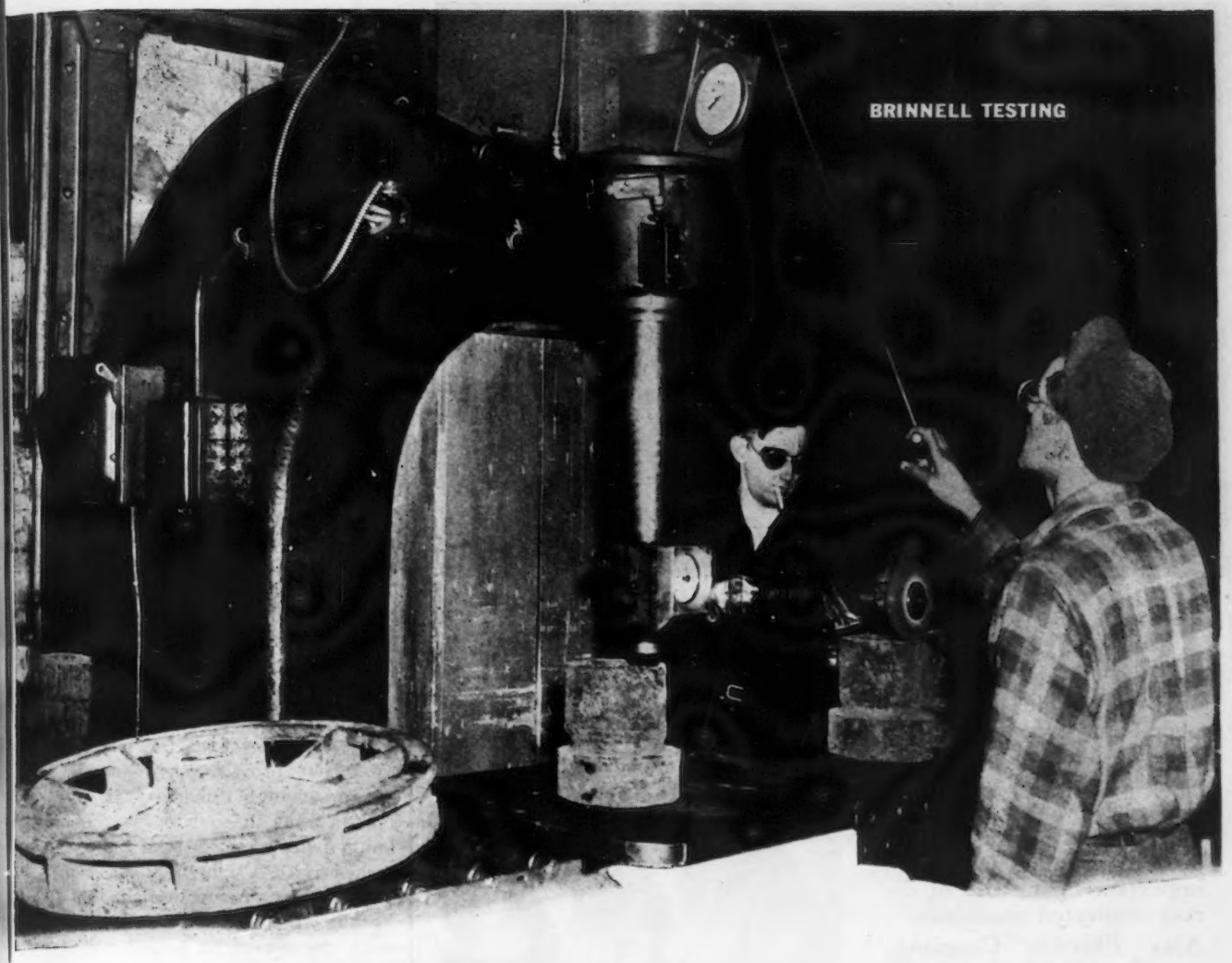
*Chicago*

• • • **Increased production** schedules for heavy ordnance materiel have been plotted by Pullman-Standard Car Mfg. Co., here, and current activity in the plant is greater than at any time since tank production ceased nine months ago.

Not only is the plant enlarging its heavy artillery production for the Army, but it also is preparing to commence production on a large Navy order for heavy caliber anti-aircraft shells.

Production of some items will increase more than 100 per cent, according to the company, and large personnel additions are contemplated.

"We have been asked by the Army to increase materially our rate of production on 155 mm. guns and to continue producing at capacity rate the mammoth six wheel transport wagon for 240 mm. guns," B. J. Trautman, acting works manager, states. "In addition we will begin next month the building of carriages for another heavy gun."




# QUALITY
## STEEL CASTINGS

CONTINENTAL quality carbon and alloy steel castings are produced under high standards of craftsmanship and must meet complete inspection requirements before leaving the factory.

Continental's vast production capacity with modern equipment, special machinery, complete heat treating facilities and special inspection devices are the answer to Continental leadership in the steel casting industry. *Continental Foundry & Machine Company, Chicago—Pittsburgh.*

**CONTINENTAL FOUNDRY & MACHINE COMPANY**

CHICAGO · PITTSBURGH

FORMERLY
CONTINENTAL ROLL & STEEL FOUNDRY COMPANY

## Minor Price Changes Made on Certain Ores By OPA Regulation

*Washington*

• • • **OPA recently** announced two minor changes in the regulation covering iron ore produced in Minnesota, Wisconsin or Michigan, involving the pricing of special ores not specifically named in the regulation and the pricing of such ores not previously produced. The changes were effective July 22.

To make its meaning clearer, the provision—Section 7 (b) (4)—dealing with maximum prices for special ores not specifically named has been rewritten. This provision was intended to adjust the maximum prices for such ores to the same extent that an adjustment was made in the maximum prices for standard ores.

The regulation at present contains no method by which a maximum price may be determined for such special ores not previously produced. The second change remedies this by providing that in such cases the maximum price shall be the price established by OPA upon application by the seller. Any price established by OPA through this procedure will be in line with the maximum prices established by the regulation for other ores.

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PREVENTATIVE: *Daniel Mapes, Walter Kidde & Co. vice-president of engineering, indicates clean hole left by bullet in carbon dioxide cylinder after it was wrapped with high tensile steel wire. The new wrapping process prevents fragmentation which causes flying shrapnel when cylinder used in airplanes is hit by enemy bullets.*

# NEW LIFE FOR STARVED BEARINGS

## SUN H.D. LUBRICANTS

### *Flow Freely...Don't Choke Feed Lines...Cut Bearing Wear*

When lubrication troubles invade your mill equipment and bog down production, reduce bearing life and raise costs, . . . take a tip from one steel company on how they stopped their blooming mill headaches.

**Feed lines were choked** by lead soap type greases, hindering steady flow of lubricant. Hard-working roll neck bearings and run-out table bearings were being starved and began to show excessive wear. Inability of pumps to handle the grease raised maintenance costs. Down-time slowed production.

**A switch to a Sun H. D. Lubricant,** at the recommendation of a Sun Oil Engineer, brought quick relief to hungry bearings. Free-flowing Sun Grease does not clog feed lines, assuring safe, constant protection for bearing surfaces. It won't wash off . . . won't squeeze out . . . won't dry out. Bearing wear hit a new low, holding down repair costs.

**Call a Sun Oil Engineer for assistance** in solving your lubrication problems. Sun makes a complete line of petroleum products for every industry—general lubricants, cutting oils, mineral spirits for cleaning metals, processing oils.

**Save equipment, time, labor** in your plant with Sun's Save and Serve plan that offers the "know-how" on proper lubrication . . . on getting more out of your plant equipment. Includes useful oil and grease hand-books, technical bulletins, wall chart, poster, other data, free to you. Descriptive folder is yours by writing . . .

**SUN OIL COMPANY · Philadelphia 3, Pa.**

*Sponsors of the Sunoco News Voice of the Air — Lowell Thomas*


## SUN INDUSTRIAL PRODUCTS

*HELPING INDUSTRY HELP AMERICA*

## *Mixed Feelings Greet Nelson's Victory In Reconversion Battle*

***Cleveland***

• • • **Donald Nelson's early victory** in the battle for reconversion is greeted with mixed emotions here according to a survey of opinions.

Army and WMC headquarters are still dubious of the morale and labor effects. The SWPC is reservedly jubilant over a step which seems to foster the smalls. WPB follows Nelson loyally but foresees the problems in war production ensuing and larger plants are loud in decrying the commercial advantages to be gained by smalls in their industry but industry-wise thinkers heartily support the plan in the interests of the national economy.

Geo. T. Trundle, Jr., president of Trundle Engineering and an industry-wise thinker, sent the following message to Nelson, Sen. Murray, Sen. Truman and others recently: "It is my sincere belief that some civilian production can be resumed without any interference with war production. In fact, it may improve war production in that labor will see other jobs being made ready for when fighting ceases. Unless conversion is started now in those plants and those communities where labor is available, serious labor unrest and the forced closing of many small plants no longer needed in war production will result. I urge that you release material now in accordance with the plan and give civilian production the go ahead regardless of whether one plant or a whole industry may be started . . . it takes time to convert . . . we're already six months late in starting."

The Army and WMC concern over workers' morale and labor shifting as a result of civilian production is pooh-poohed by industrialists who state that from their observations morale is already shot and many workers are doing as little as possible now in an effort to stretch war jobs to the limit.

Plant efficiency is said to be not over 60 per cent of prewar normal. This would be about 48 per cent of theoretical plant capacity and is charged against unproductive labor . . . not poor mechanization of industry. Deliberate slow-downs in some areas are reported as a means of job stretching. Migration of workers is expected to be controlled by the

# SOAKING PITS

**Holes in the ground** were the first device for evenly distributing throughout the steel ingot, the heat from its molten interior to its solid exterior, to make it ready for rolling. John Gjers, Swedish-born steel engineer of England, in 1882, seeking to avoid time-wasting, costly practice of allowing ingots to cool and then reheating them to rolling temperatures, placed each ingot in a brick-lined, covered hole in the ground. These heat-retaining holes, forerunners of modern, complex steel ingot-heating furnaces, were called "soaking pits." The holes have long been obsolete, but the name lingers on.

**Gjers' idea was successful** from the start and the new practice spread from England to the Continent and to the United States within a dozen years. The Henry Bessemer medal was awarded Gjers in 1894 by the British Iron and Steel Institute "for great service" to the industry by his soaking-pit invention and other improvements in iron and steel production.

**The baptism of fire** given steel ingots today in modern, intricate, scientifically heat-controlled and skilfully tended ingot heating furnaces, is a far cry from the holes in the ground put to use by the son of a Swedish army officer in England back in the 80's. The soaking of ingots in pits is one of the most important steps today in the march of steel from iron ore to finished product. Without soaking pits there could not have been the present record production of steel for war—90,000,000 tons last year in the United States, more than all the rest of the world.

**Shriller than a bo'sun's** in a gale, is the whistle piercing the deep undertones of a steel mill that is the signal to start ingots coming up from the soaking pits to the blooming mill to be rolled into long blooms or wide slabs. After this first rolling, the steel passes on through other mills and other processes to wind up in many sizes, shapes and grades adaptable for manufacture of countless articles useful in peace, as well as war.

**Only 15% of surgical instruments** sold in this country before the war were made here. Now most instruments and hospital equipment for our armed forces are American made. The industry is producing about 60,000 tons of special steels for some 5,000 applications required by Army and Navy Medical Corps. This entailed learning how to achieve production of many highly specialized steels formerly imported from Europe.

**Conquering new horizons** in metallurgy since World War I, American scientists have put the U.S.A. far ahead in production of better industrial steels, and in development of super-fine special steels. For example they have (1) Created new high temperature and corrosion-resistant steels for hospital and laboratory; (2) Helped make possible the mass fabrication of these steels into surgical instruments of unparalleled efficiency; (3) Materially aided vast life-saving developments within the pharmaceutical industry.

WMC job freeze and referral funnelling of workers . . . not by suppression of civilian production.

WPB and WMC take the attitude that workers are not deliberately slowing down but instead are tired and need refreshing. This seems a well made point as several manufacturers in this area have stated that a two-week shutdown would do enough good to permit the lost production to be more than recouped by the rested workers in a single quarter. Unfortunately, scheduling of components and production lines will seldom permit such shutdowns.

Larger plants that have gone all out for war production and promise to be tied up for the duration on war contracts are reluctant to see the small plants in their own fields get the commercial advantage of an early start in civilian production while they languish in the tentacles of lengthy war contracts or termination proceedings. WPB says that the larger firms can easily overcome any commercial advantages gained by the smalls and in any event are probably well reimbursed financially, as a result of steady war work, for any losses sustained from slight loss of starting advantage in civilian production.

The plan is well accepted by the

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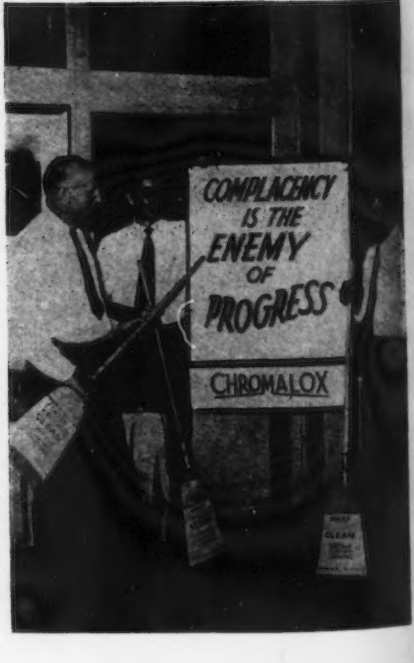
CLEAN SWEEPERS: *At Pittsburgh, E. N. Calhoun, president, Edwin L. Wiegand Co., manufacturers of Chromalox heating units, points out slogan used as the theme of a recent engineering conference. Looking on: Mark Greer (center), vice-president, and Bruce Fleming, another vice-president.*



# *Making* SHORT *work of Long turns*

*with*

## *MAINTAINED ACCURACY*

The exceptional performance of Kennametal on long cuts works miracles in steel-cutting shops where taper is a bug-a-boo that means, at the best, expensive reworking and finish grinding, and at the worst, a high rate of rejections. Kennametal contains a unique intermetallic compound (tungsten-titanium-carbide) that gives it unmatched hardness. Used properly, it can remove stock from the toughest steel up to 3½ times more effectively than other carbides!

Our engineering staff knows and understands the amazing inherent characteristics of Kennametal and how best to apply them to any specific cutting job. There is an experienced field engineer in your district ready to help you select the right grade of Kennametal, and to determine the proper tool design and the most efficient machine set-up. When these factors are nicely balanced—Kennametal breaks production records!

Get acquainted with Kennametal. Write for our descriptive Catalog 44 that contains information on tool design, use, and maintenance.

KENNAMETAL

SUPERIOR CEMENTED CARBIDES

KENNAMETAL Inc. LATROBE, PA

government agencies on the whole. It is thought that all but makers of single products for the war will soon have some capacity open due to cancellations. Idleness of this capacity would mean unemployment, they say, and certainly cause labor unrest since labor's chief plea is for guaranteed income or assured work.

Nelson's plan is also generally favored because it indicates a gradual, rather than an abrupt, removal of limitations. The ultimate dropping of limitations for specific manufacturers and areas will come through the decisions of the local urgency committees and the WMC labor priority committees. Complete freedom from limitations is still the most popular desire but slow transition to this condition now is well received.

Analyzing the reconversion argument between large and small plants financially, it appears that both run a certain amount of risk. The larger plants which could handle large war contracts (where small plants couldn't) have had the advantage of steady high sales and production volume throughout the war while small plants, in great part, handled only short orders, worked in spurts and felt no financial help from the war volume. Since the small firms were left out of a great part of the war's business it is felt justifiable that they should be first to cash in on civilian production. There is a risk here, however, as first civilian items made with today's high production costs and OPA ceiling sales prices may not prove too profitable.

The bigger firms are confronted with continued war orders, and the loss of considerable commercial sales advantage in civilian products through an early grab of the market by smaller producers. It is felt by many that the high production, low-cost advantages of the big concerns will enable them to rapidly overtake any lead the smalls may get providing that this proves to be an advantage. The time lost in developing sales organizations and dealer outlets on the part of the bigs is their greatest worry since the small firms may be in a position to grab off the cream of both at an early date.

Summed up, few people side with the military point of view and most thinkers favor Nelson's approach to reconversion now on whatever scale the war will permit.

# Which of these Wire Ropes Would You Use?

Years ago wire rope was not the highly specialized product it is today, nor was there as much use for wire rope or so many *different* uses.

Because of the many kinds of equipment using wire rope, plus the many and varied applications of that equipment, many sizes, grades, and constructions of wire rope must be made.

This makes it difficult for wire rope users to select the correct rope.

If the equipment is used in the normal way under average conditions, the manufacturer of the equipment can and does offer suggestions as to the type of rope they believe is best.

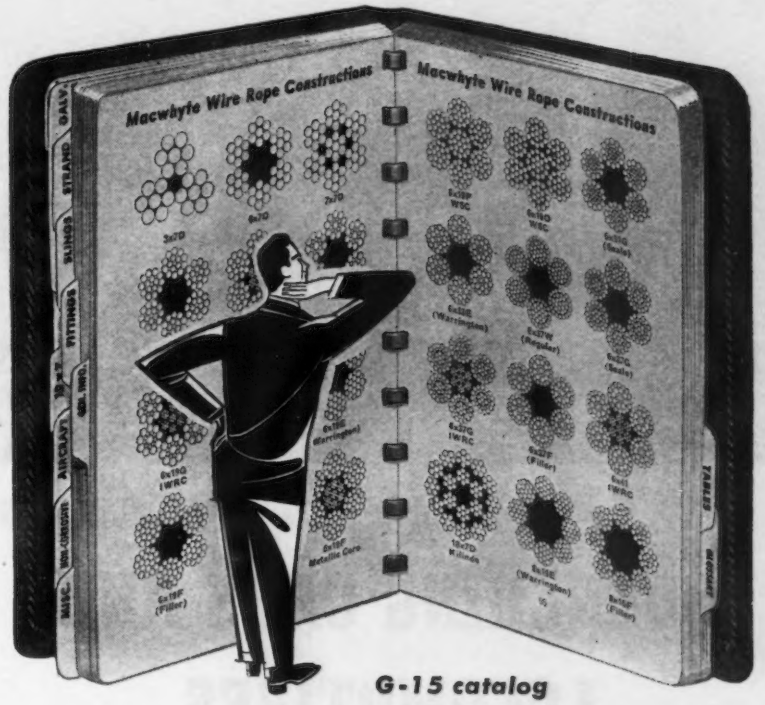
But should the equipment be altered to suit special needs, or should conditions not be average, a different wire rope specification is usually necessary for the best service.

### *Many Factors Considered*

In recommending the correct wire rope for your equipment, several factors need to be considered:

1. Safety Factor—This has to do with the amount of loading and whether it is steady or a shock load.
2. Bending Fatigue—This has to do with the number and size of sheaves, size of drum, and also speed of rope.
3. Abrasion.
4. Type of Equipment.
5. Use of Equipment.

Conditions of service on a given type of equipment vary so much that it is often helpful to know the type of rope previously used and the service it gave.




*G-15 catalog*

Then after a study of this information, wire rope can be recommended that experience proves will give the best service.

Sounds difficult, doesn't it? Really it isn't difficult when you have the advice and counsel of Macwhyte Wire Rope Engineers. Just write to Macwhyte Company, its distributors or mill depots. Tell them the make and model number of your equipment, explain briefly what it is being used for, and mention the size, grade, and construction of the rope you are now using.

Remember — Macwhyte makes the "Correct Wire Rope For Your Equipment."

Pictured above are but a few of the types of wire rope made by Macwhyte so that you may have the "Correct Rope For Your Equipment." There is a size, grade, and construction of Macwhyte Wire Rope that will give you low cost, safe service.

MACWHYTE PREformed WIRE ROPE

Plus Internal Lubrication Selected Steels Tested-Proved

*The correct rope for your equipment*

NO. 707

# MACWHYTE COMPANY

*Wire Rope Manufacturers*

ARMY E NAVY

2911 FOURTEENTH AVENUE KENOSHA, WISCONSIN

*Mill Depots:* New York • Pittsburgh • Chicago • Fort Worth • Portland • Seattle • San Francisco. Distributors throughout the U.S.A.

MACWHYTE PREformed and Internally Lubricated Wire Rope · MONARCH WHYTE STRAND Wire Rope · MACWHYTE Special Traction Elevator Rope · MACWHYTE Braided Wire Rope Slings · MACWHYTE Aircraft Cables and Tie-Rods · MACWHYTE Stainless Steel Wire Rope · MACWHYTE Monel Metal Wire Rope

## Magnesium Group In Interesting Meeting On Technical Advances

*Chicago*

• • • **A well attended** meeting of the Magnesium Association here July 12 heard a stimulating discussion of the place of magnesium in today's and tomorrow's technology, developed by six experts from Battelle Memorial Institute, Columbus, Ohio.

Papers were given by Clyde E. Williams, Battelle director, who spoke on the advantages of lightweight metals and industrial applications as compared with older methods; V. H. Schnee, assistant to the director, who outlined seven research programs now in process on magnesium throughout the country; John D. Sullivan, who spoke of earlier pre-war production and described the four magnesium-making processes in use in this country; L. R. Jackson, who discussed sheet research; J. C. De Haven, who compared present American alloys of magnesium with continental alloys and spoke of forging progress; and

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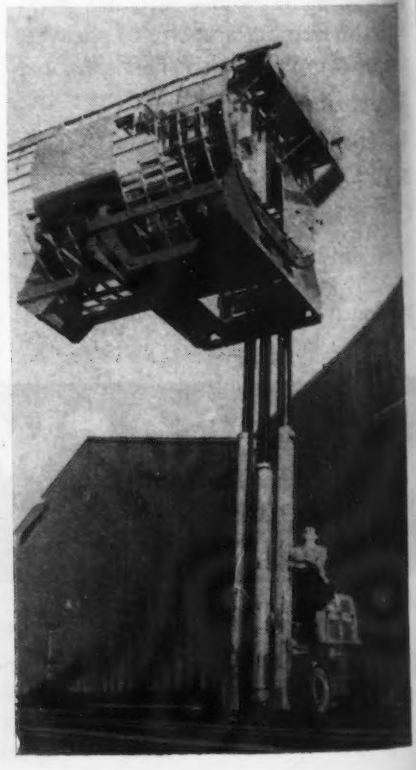
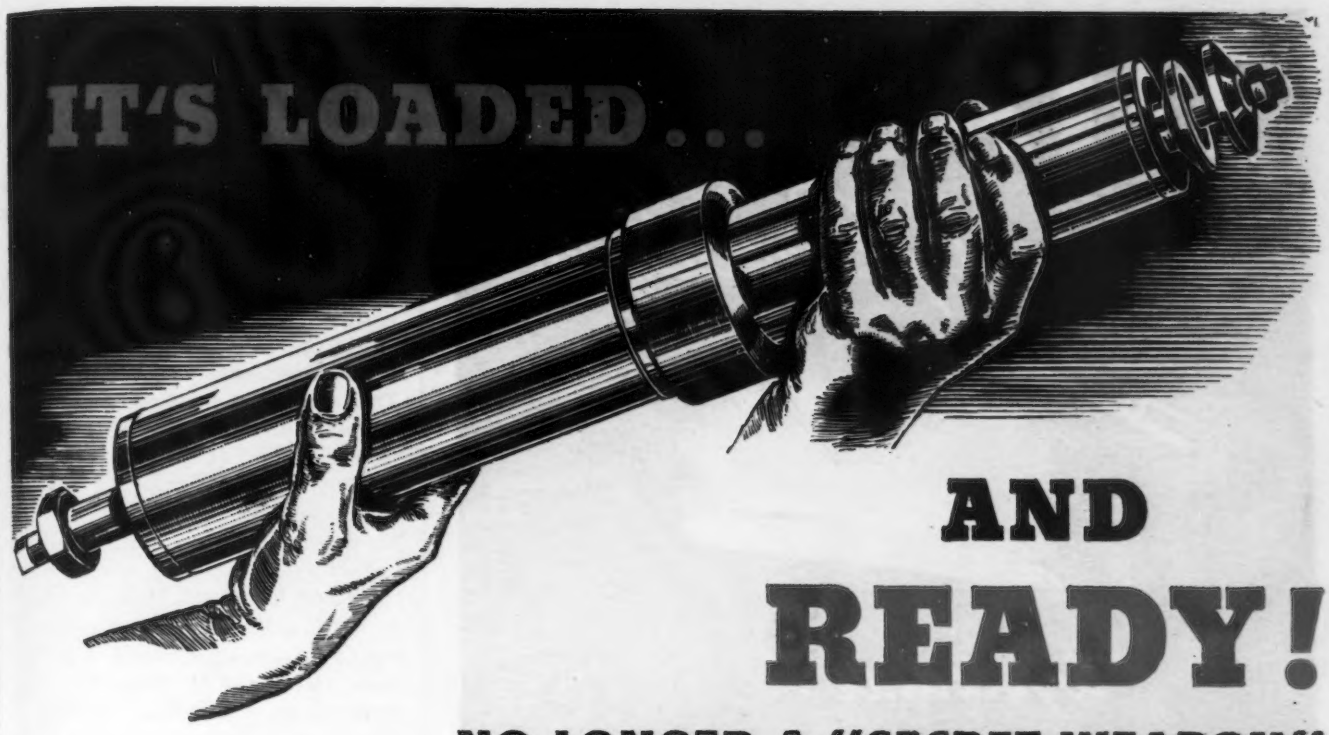
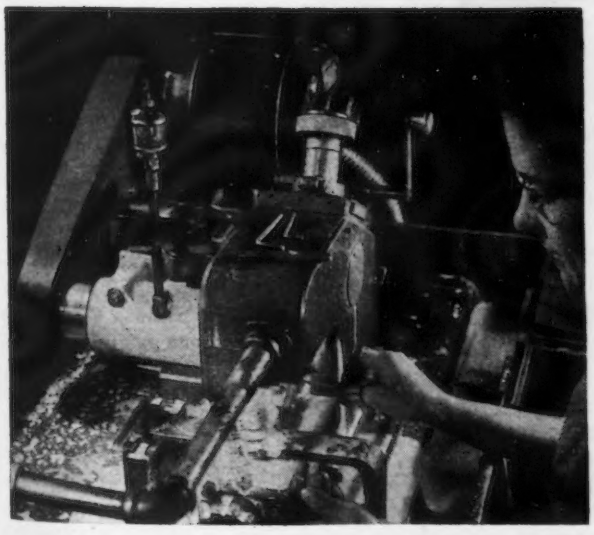
LIFT TRUCK: *A fork-lift truck raises the fuselage section of a plane at the Boeing plant in Seattle. High lifting is the job for this amazing vehicle which can pick a load off the ground and raise it 14 ft. in the air.*






# AND READY!

## NO LONGER A "SECRET WEAPON" ...BUT IN WIDE USE TODAY BY SMART PRODUCTION MEN!



**24-HOUR SERVICE...FOR NINE MONTHS**

Designed by a manufacturer of twist drills, for grinding relief on drill lands, this machine, incorporating a Dumore grinder, ran continuously for nine months, except for a few minutes each time shifts changed! Non-stop operation was maintained at no expense to precision, demonstrating the importance of the exclusive design features and manufacturing excellence that distinguish every Dumore product.

A surprising volume of precision production available with a minimum of set-up work and applicable to a wide range of grinding operations is packed into this sleek steel cylinder. It is the quill or essential heart of a Dumore lathe grinder, itself an example of skillful engineering and manufacturing methods of the highest order. In countless metal-working plants this precision tool has been the answer to production grinding when special purpose equipment is unavailable or when the use of such equipment would be uneconomical for the operation involved. At a minimum of investment the Dumore grinder provides quickly expanded grinding facilities, capable of working to closest tolerances. Operation is simple and easy for new workers.

How to apply the unique advantages of the Dumore Precision Grinder to your specific production problems? Read the interesting story in latest Dumore Catalog. Ask for it, today! Write The Dumore Company, Tool Division, Dept TG24, Racine, Wisconsin.

SOLD BY AUTHORIZED INDUSTRIAL DISTRIBUTORS IN ALL PRINCIPAL CITIES

**DUMORE**

PRECISION AND OFF-HAND GRINDERS

C. H. Lorig, who talked on sand cast alloys.

A general discussion was held in which further information was brought out by the company members present. Represented at the meeting were three Canadian firms.

It was announced that the Magnesium Association has set up new offices in New York City at 3239 R.C.A. Building, 30 Rockefeller Plaza. These are under the direction of a new secretary-director, Perry D. Helser, formerly Chief of the Magnesium Division of the War Production Board.

The next meeting of the sand cast division of the association, it was announced, will be held at the Hotel Cleveland, Cleveland, Ohio, on August 9. The next meeting of the Magnesium Association itself will take place October 4 in New York City, preceded by a directors' meeting at the offices of the association on October 3.

## National Carbon Organizes New Sales Set-Up in 7 Cities

• • • **A new sales set-up** under which all company products will be handled nationally from seven divisional offices is being installed by National Carbon Co., Inc., it is announced. Four of the new offices are in operation and the others will be added by Oct. 1.

All sales activities in the Southeast have been consolidated under a new Atlanta Division office. J. F. Warnell will be division manager with C. J. Chapman assistant manager. C. C. Joslyn is manager of the new Dallas, Tex., division. At Kansas City, A. C. Bryan has taken over as division manager, and E. L. Dibble is assistant manager. R. P. Tolles will direct the new San Francisco office.

The three division offices yet to be opened will be located at Chicago, Pittsburgh and New York.

## Douglas Succeeds Young

*Washington*

• • • **James Douglas,** Washington, formerly director of the WPB Zinc Division, has been appointed deputy vice chairman, suceeding Howard I. Young, resigned.

In making this announcement, Philip D. Wilson, WPB Vice Chairman for Metals and Minerals, made it known that the Zinc and Tin-Lead Divisions are being consolidated under the direction of Erwin Vogelsang, New York, formerly director of the latter division.

## Large Order Placed For Aluminum Alloy Railroad Hopper Cars

*New York*

• • • **That progressive railroads are looking ahead to the postwar period has been evidenced for some time by the mounting orders being placed for the building of modernized equipment, once peace is declared and the country goes back to its normal peacetime building program. The palm, however, goes at this time to Missouri Pacific Railroad which has just placed an order with American Car & Foundry Co. for 25 aluminum alloy hopper cars of 70-ton capacity, the first railroad ever to place such an order.**

While the use of light weight metals for carbuilding has been featured in the press for some time in the past, the only cars of this type ever to be built were for experimental purposes and for special services only.

Aluminum alloy will be used for the entire body of these cars while the center sill and bolster will be steel. The cars will each have an empty weight of about 38,000 lb. compared with an average 50,100 lb. for conventional all steel 70-ton hopper cars. They will be 39 in. longer than the usual all steel units, permitting a capacity increase of 240 cu. ft. The aluminum sheets are to be somewhat thicker than the conventional steel, giving them equal strength.

## Adopt Dial Indicator Standard

• • • **Based on signed acceptances from manufacturers, dsitributors and users, the Proposed Commercial Standard (Emergency) for Dial Indicators may be considered effective for new production from Jan. 1, 1945, according to the National Bureau of Standards. The standard, which is identified as CS(E)119-45, sets up nomenclature, standard dimensions, dial sizes, classes of numbering and marking. On English measure dials, the dial numbering shall always indicate thousandths of an inch, irrespective of the class of dial marking, and shall be in decimals rather than fractions. Mimeographed copies TS-3751, of the standard may be obtained from the National Bureau of Standards, Washington 25.**

# KEEP PACE WITH PROGRESS

**The Howell Protected Type Motor,** shown, gives complete protection against dripping liquids, metal chips and other falling particles. Completely streamlined—utilizing non-breakable steel frame—malleable or steel base—cast iron end plates and cast iron, weatherproof terminal box are standard construction features. Special horizontal and vertical mountings are available.

*Available in sizes 5 H.P. and smaller.*

**ELECTRICIAN:** What are *you* doing here?

**HORSE:** I'm going to give you a tip—going to steer you straight to the best buy in electric motors.

**ELECTRICIAN:** We've been buying motors from the same firm for 17 years—we know motors.

**HORSE:** That's just it. A lot of improvements have been made since you first investigated motors. Take Howells, for example. All our motors are precision-built—many of them are specially built for the job they are to do. Today, we're building specialized motors for machine tools, ventilating fans, air conditioning equipment, dairy work, almost every job you can name. And Howell Motors are doing these jobs at lower costs and with less trouble.

**ELECTRICIAN:** You mean you will furnish specialized motors for my job? Why, I thought I had to take standard motors! I guess I better keep pace with progress.

*Get acquainted with Howell Motors now. Phone the nearest Howell representative or write direct to the factory.*

**HOWELL ELECTRIC MOTORS COMPANY**
**HOWELL, MICHIGAN**
***Manufacturers of Quality Motors Since 1915***

## *Rail Operators Obtain Individual Authority*

***Washington***

• • • **WPB has announced** that operators of transportation systems who have not been able to take advantage of the provision for placing advance orders for delivery of special items of car materials because they had no first quarter 1944 authorization to use as a "base" may be given individual authorization for such a "base."

Direction 3 to Order P-142 provides that advance orders for items governed by the direction—air brakes, power hand brakes, brake beams, couplers, coupler bodies and car bolster springs—may be placed by rail operators for delivery in each of the three quarters following the quarter in which the order is placed. It provides that an operator may order for delivery in each advance quarter up to 75 per cent of the amount of each of the above items authorized for him for the first quarter of 1944.

Direction 3 was amended to provide that if an operator has no first quarter 1944 authorization to use as a "base" against which to apply the 75 per cent quota for advance ordering of any item under this direction, WPB may establish a base by written authorization to the operator.

The amended direction also provides that WPB may direct that an operator's base be increased or reduced if his first quarter 1944 authorization does not properly represent his advance quarterly needs for the particular item. If such a revised base is established, the operator may place advance orders against it, subject to all provisions of Direction 3.

---

ALL-METAL TYPE RAM: *Shipyard workers operate a new type all-metal ram in changing keel blocks at the Ingalls Shipbuilding Corp., Pascagoula, Miss. The new ram, equipped with steel handles, has a collapsible stand.*


The Harper organization devotes its energies and facilities exclusively to non-ferrous and stainless fastenings. It manufactures bolts, nuts, screws, washers, rivets and specials of Brass, Bronze, Copper, Everdur, Monel and Stainless. It produces nothing in common steel or iron.

Harper offers a large and widely assorted stock of over 4280 different items . . . extensive manufacturing facilities . . . a major department engaged in designing and producing "specials" . . . engineering "know-how" . . . and field service difficult to match elsewhere. All of which

## COME TO THE PLANT THAT SPECIALIZES ON THEM . . . *and nothing else*

means much to the fastening buyer and user.

New four color, one hundred four page catalog and valuable reference book ready soon.

**THE H. M. HARPER COMPANY**
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***Representatives in Principal Cities***

# HARPER

EVERLASTING FASTENINGS

ARMY E NAVY

**BRASS • BRONZE • COPPER • EVERDUR • MONEL • STAINLESS**

## *Batcheller Comments On Plate Imports*

***Pittsburgh***

• • • **The steel industry** has not failed in any of its commitments for the war effort since Pearl Harbor and is deserving a "ribbon of recognition" for the job it has done, President Hiland G. Batcheller of the Allegheny Ludlum Steel Corp. told more than 70 of the company's district sales managers and key sales executives.

Mr. Batcheller's remarks were made when asked to comment on a report by WPB last week that the United States has started importing 10,000 tons of steel plate monthly.

"I hope you will take it as a part of your job to make sure the many persons with whom you come in contact all over the country will understand the importing of 10,000 tons of plate monthly is but a drop in the bucket to America's total plate production," he said. "It should be remembered that production of steel plate has been boosted from 475,000 tons annually before the war to more than 1,250,000 tons now.

"While we are grateful to our ally, England, for every pound of plate she can provide, it is not a reflection on our own ability to produce when the industry's fine record is kept in mind. We are now shipping abroad under lend-lease arrangements more than 100,000 tons monthly of steels of all types and some time ago when the requirements were greater this ran higher than 200,000 tons monthly.

"A look at steel's production record for the first half of this year is a further illustration of what I mean. In this period the industry produced more than 45,000,000 net tons of ingots, an increase over the same period last year of almost 2,000,000 tons—and a figure equal to that of all the rest of the world combined. All of this was done too, with 63,000 fewer men as of last May, than were available during the first half of last year." American Iron and Steel Institute figures for May showed an average of 569,000 working in basic steel, compared with 632,000 in May of 1943.

The two-day Allegheny-Ludlum sales conference was devoted to ways and means of meeting the wartime needs of essential steel produced by the company and to the problems which must be met to help bring about a maximum of postwar employment.

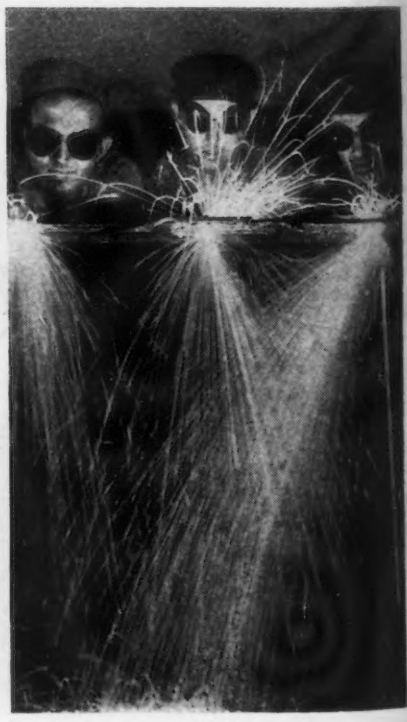
## Canada Eliminates The Middleman in Selling Surplus War Assets

***Ottawa***

• • • C. D. Howe, Minister of Munitions and Supplies, announced in the House of Commons that Canada's surplus war assets will be sold directly from the Government to the ultimate consumer as far as possible and not through intermediary contractors or dealers. The disposal will be made through Crown Assets Corp., and, he said, the corporation might pay some commissions on sales but it would not sell in such a way as to open up the prospect of profits.

As an example of the new corporation's plan, Mr. Howe stated that trainer aircraft which cost $67,000 each, and which no longer were useful in the Canadian Air Training Plan, had been sold to Mexico for $1500 or $1400 each. This sale was one of those which made up a total of $350,000 realized to date on the disposal of surplus war assets. The principal items making up the total were: Aircraft, $69,100; automotive equipment, $18,361; machine tools, $23,809; scrap metal, $17,580; miscellaneous scrap, $1007; sundry supplies, $1890.

**FIREWORKS:** ***Burners at U. S. Steel's Federal shipyards at Port Newark, N. J., "saw" through steel with flame. These burners are helping build destroyers, destroyer escorts and landing ships. As the flame burns through, the "sparklers" make a dazzling display.***



# Here's a great small spotwelder that is

★ *sturdy...*

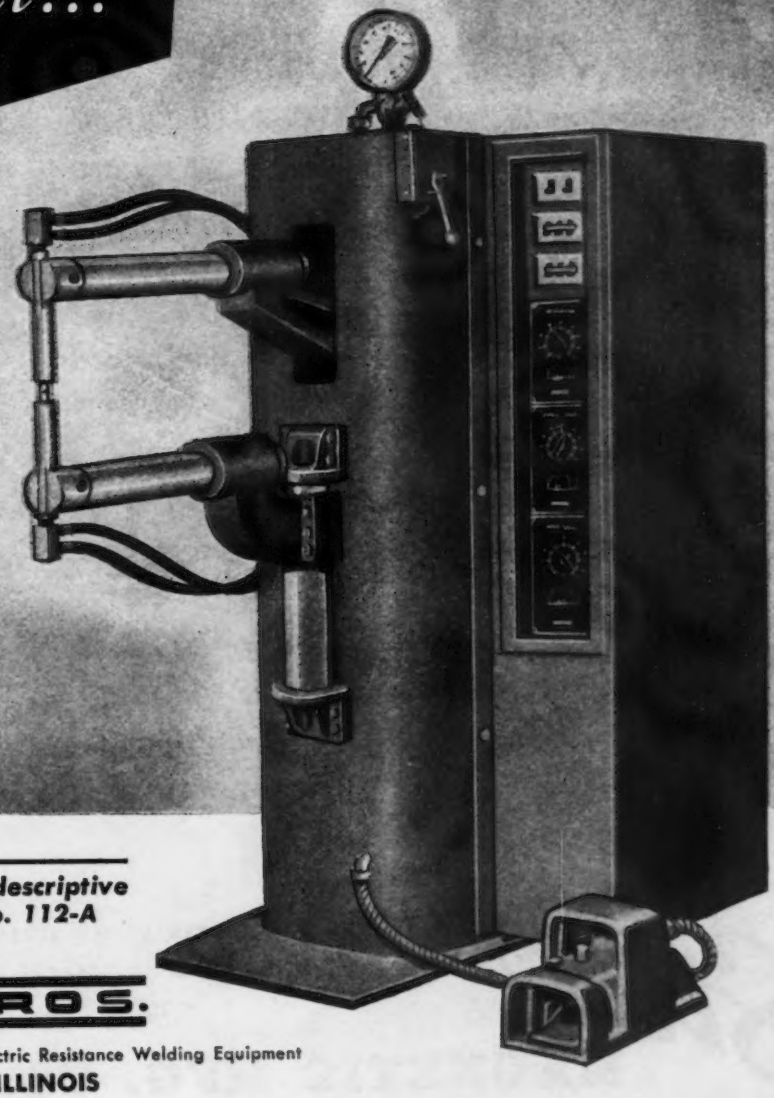
★ *precise...*

★ *fast...*

★ *compact...*

SCIAKY engineering has proved that it is possible to make a machine that is small, yet capable of delivering fast, high quality spot welds in day in and out production. Incorporated in this rocker arm type welder are exclusive features hitherto only used in larger machines. The use of heavy duty roller bearings at the fulcrum point of the arm, together with a special rubber cushion in the pressure cylinder, assure smooth action . . . eliminate hammering and wear. The design is compact with controls and contactor in a hinged cabinet . . . dials are convenient to operator and unit may be easily installed or moved.

If your problem involves the fabrication of mild, stainless or zinc-coated steels and brass in light gauges, it will pay you to consider the "PMCR.0-1."



**MODEL PMCR.0-1**

**Rated 30 KVA at 50% duty cycle for power supply of 440 or 220 volts, 60, 50 or 25 cycles. Capacity: clean mild steel from two thicknesses of .016" up to and including .080"— stainless steel up to a maximum of .040" plus .040". Speed on two thicknesses of .032" thick pickled mild steel is 180 welds per minute. Maximum electrode pressure at 24" throat depth is 1000 lbs.**

***Write for descriptive bulletin No. 112-A***

**SCIAKY BROS.**

Manufacturers of a Complete Line of AC and DC Electric Resistance Welding Equipment

**4915 W. 67TH ST., CHICAGO, 38, ILLINOIS**

In England: Sciaky Electric Welding Machines, Ltd., London

Branch offices in Detroit and Los Angeles

## Expanded Civilian Employment Reaches 52,000,000 for May

*New York*

• • • **After expanding** for three consecutive months, the number of civilians employed in the United States reached 52,000,000 in May. However, this figure was below the wartime high of 54,600,000 in July last year and was also smaller than in May last year when the number employed was 52,600,000, according to the Alexander Hamilton Institute.

The fact that employment in May was below peak levels was apparently due primarily to a shortage in the labor supply rather than to a shortage in jobs. Although the total labor supply was 63,900,000 in May, 11,000,000 were in the armed forces, leaving a civilian labor supply of only 52,900,000.

## Dodge Gives Half-Year Figures

*New York*

• • • **F. W. Dodge Corp.** reported recently that the valuation of all construction contracts awarded in the 37 states east of the Rocky Mountains during the first half of this year totalled $960,221,000, compared with a total of $1,851,272,000 for the first six months of last year.

While the total of all construction contracts was down considerably, privately owned projects increased from $239,312,000 during the first six months of last year to $243,543,000 for the corresponding period of 1944. During the first half of last year privately owned projects represented only 13 per cent of the total contract awards, and this year they represented 25 per cent of the dollar value of all construction.

## Consumer Goods on Increase

*Chicago*

• • • **40 per cent increase** in sales of radios, refrigerators, air conditioners, automobiles, and all other consumer durable goods over the best pre-war year can be expected in the first twelve months of full production after victory, it was predicted by James H. Carmine, vice president in charge of merchandising for Philco Corporation, in an address before an appliance industry dinner in the Furniture Club of America at the American Furniture Mart here.

## *Liquid Steel Temperatures*

(CONCLUDED FROM PAGE 41)

tion is quite as good as could be expected, merely taking into account the uncertainty of the optical pyrometer readings, which are rarely reliable to better than ± 10 deg. C. (± 18 deg. F.).

Ladle cooling readings obtained with the alloy steel are set out in Table II, which also includes two results on carbon steels (A537 and A539). The ladle was of normal design capable of holding 14 tons of molten steel. In these experiments the average content of metal was approximately 10 tons.

The average value of the temperature drop between furnace and ladle was 60 deg. C. (180 deg. F.), the range of variations being 23 deg. C. (41 deg. F.), *i.e.*, ± 12 deg. C. (± 22 deg. F.). The authors have pointed out previously that there is likely to be this range of uncertainty in furnace temperature measurements; in addition there is an uncertainty of at least 5 deg. C (9 deg. F.) in estimating the change in temperature between the last dip measurement in the furnace and the commencement of tapping. The results therefore can be considered concordant within anticipated limits.

One of the authors has published a mathematical analysis of the ladle cooling of liquid steel, stating that the figures given in the report should be multiplied by a constant factor to be determined experimentally. The value of the ladle cooling calculated from the published tables is 78 deg. C. (140 deg. F.) for the conditions of the experiments, so that the constant factor in this case is 0.7. It remains to be seen, however, whether this value is equally valid for a wide range of conditions.

### Conclusions

A simple and successful method has been devised for measuring the temperature of the casting stream in the foundry. It can be applied to castings of more than 560 lb. in weight with only slight modification of standard foundry practice. It appears essential to employ some type of high-speed temperature recorder in view of the short time available for the measurement. The method appears to be suitable for the investigation of emissivities and the ladle cooling of liquid steels under foundry conditions.

# MODERN PACKAGING for War!

Official U. S. Navy Photograph

TOJO will lose his appetite for war before his men have "eaten" all the metal our Navy guns are throwing at them.

Much of this fine "food" for Japs is packaged—ready for action—in hermetically sealed containers such as the tanks encasing the 5″/38 caliber cartridges which are being loaded on the U. S. warship above.

Brilliant planning and efficiency in the production of tanks won Norris Stamping and Manufacturing Company its original Navy "E". (Subsequently Norris received Army-Navy "E" flag and four stars.) This functional modern container, 6″ in diameter by 30″ tall, is drawn entirely from one piece of metal.

The rapid progress from aluminum sheets to finished tanks is dramatically visible in operations such as the "ironing" where tanks lengthen out as they pass through the drawing dies . . . and the paint booth where tanks moving through a positively charged field of electricity are smoothly coated with enamel by automatic spray guns.

Scientific cleaning based on pH Control is an essential factor in the functioning in this record-breaking production line.

An automatic washer removes every trace of drawing oils with Kelite KDL No. 1 . . . rinses, etches the aluminum with Kelite Super S for perfect paint adhesion . . . rinses, neutralizes, rinses again; and, finally, oven dries the tanks. Proper temperatures in the successive tanks and compartments are maintained by thermostats. Effective strength of the chemical solutions is controlled by pH.

The tanks proceed from drawing to painting in a short time, with no hand labor. Rejects are held to an all-time low.

This abbreviated account of an industrial triumph is an example of the efficiency which *scientific control* in cleaning and processing helps to achieve.

## *Control of Atmospheres In Open-Fired Furnaces*

(CONTINUED FROM PAGE 38)

inhibits decarburization. Also, since this type of atmosphere produces a definite layer of scale, the removal of metal will produce the effect of "scaling off" surface defects, including the decarburized area.

At this point it would be well to consider the limits of control of an open-fired furnace atmosphere. In spite of modern fuel controls, it is very difficult to maintain continuously a constant furnace atmosphere. For example, it is very difficult to maintain an atmosphere in an open-fired furnace, which consists of the products of complete combustion only (i.e., no free air or no uncombusted fuel). Therefore, it is well to aim for a range of atmospheres rather than for some definite analysis.

With this in mind, the most favorable range of atmospheres can be chosen. A *reducing atmosphere* produces a "tight scale" and decarburization. An *oxidizing atmosphere* produces more scale, of a flaky type, which inhibits the decarburizing action to some extent, and "scales off" surface defects including decarburization. An atmosphere consisting of the products of combustion only would possess the characteristics of an oxidizing atmosphere because the principal active components ($CO_2$ and $H_2O$) are both oxidizing.

In general, a slightly oxidizing atmosphere is the best in heating alloy tool steels for forging or rolling. This atmosphere would contain the products of complete combustion ($CO_2$, $H_2O$, and $N_2$) plus a small amount of excess $O_2$. An excess of $O_2$ up to 4 per cent would provide a good working range. Such an atmosphere would produce a soft, flaky scale, which would tend to act as a protective coating against decarburization and would also "scale off" surface defects, which might include decarburized areas.

### Determination of Furnace Atmospheres

Most experienced heaters, heat treaters, etc., can judge the composition of a furnace atmosphere fairly well by noting the characteristics of the flames from the burners, from around doors, or from out of flues or ports. However, in a furnace operating at 2000 deg. F. or higher, it is very difficult to see and to judge the burner flame, particularly when using

# RESISTANCE
# WELDER CONTROL

E&M

**NEOTROL TIMER**
Electronic operation--easily adjustable --timing accurate over entire range.

**LINE-ARC CONTACTOR**
Fast operating--sturdily built--unequaled arc-handling ability.

# *Good Welds* at LOW COST

## ESSENTIAL--WHEREVER METALS ARE JOINED

Bomb fins are assembled by spot welding--a convenient, fast method. Photo courtesy of Thomson-Gibb Electric Welding Co.

Accurate control of the welding current is vital to successful resistance welding. For many years, on thousands of applications, EC&M Welder Control has been providing accurate control and giving universal satisfaction.

Today, we offer many forms of EC&M Timers--Non-Beat, Auto-Repeat, Pulsation, Sequence, and similar ones designed for specific applications. Also helpful literature for easier, better welding. Ask for booklet 141 and other bulletins, illustrated below, in accordance with your needs.

**HELPFUL LITERATURE**
Theory and Application of RESISTANCE WELDING, Booklet 141 • NEOTROL or NEOTROL-Compensating Weld Timer, Folder 1201 • EC&M A. C. (Resistance-Welder) CONTACTORS, Bulletin 1211 • EC&M Weld Timers, Bulletin 1201.

**THE ELECTRIC CONTROLLER & MANUFACTURING CO.**
2698 East 79th St. Cleveland 4, Ohio

gas as a fuel. For this reason, it is generally more reliable to judge the flames issuing around doors or out of flues or ports. The following description is based on observations made at these points for various fuels:

**Gas**

| | | |
|---|---|---|
| Reducing atmosphere | Flame visible | No smoke |
| *Neutral atmosphere | Very little flame | No smoke |
| Oxidizing atmosphere | No flame | No smoke |

**Oil**

| | | |
|---|---|---|
| Reducing atmosphere | Flame visible | Smoke visible |
| *Neutral atmosphere | Very little flame | No smoke |
| Oxidizing atmosphere | No flame | No smoke |

**Coal**

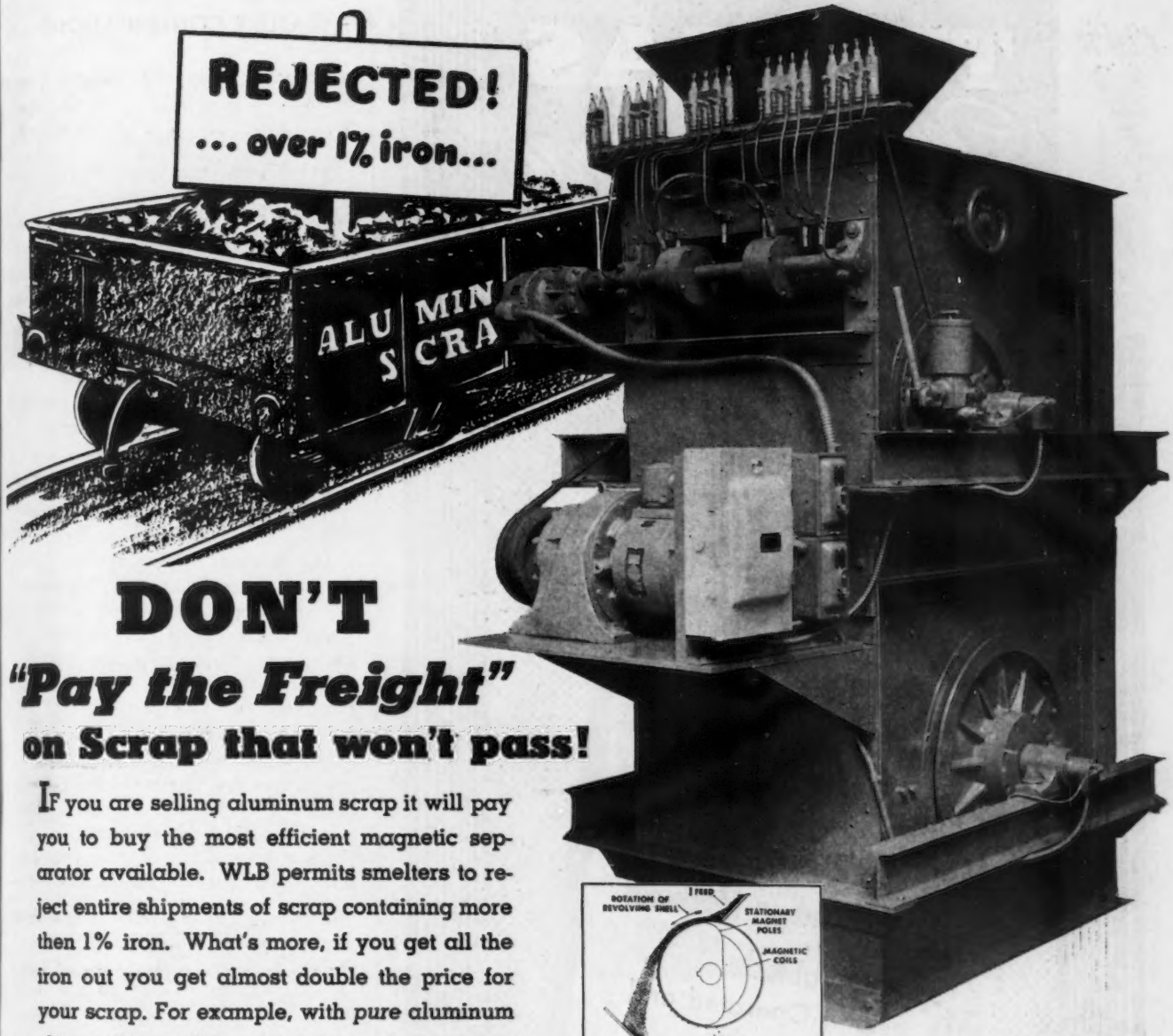
| | | |
|---|---|---|
| Reducing atmosphere | Flame visible | Abundant smoke |
| *Neutral atmosphere | Very little flame | No smoke |
| Oxidizing atmosphere | No flame | No smoke |

* In the above description the term "Neutral atmosphere" means an atmosphere composed of the products of complete combustion only, i.e., no excess air or reducing components present. Neutral in this case refers to the amount of combustion air supplied and not to the action of this atmosphere on the surface of the steel, as it has already been shown that this action would be oxidizing.

The foregoing tabulation provides a rough outline of the flame characteristics of the various types of atmospheres. A much more detailed description could be compiled on this subject. However, this could be used as a guide in adjusting furnaces utilizing these fuels.

It should be noted that in the case of all three fuels, a reducing atmosphere is easily recognized, particularly in the case of oil and coal. However, the judging by eye of the degree of oxidizing power of an oxidizing atmosphere is very difficult, particularly in the case of gas fuels. Care must be exercised to prevent the atmosphere from becoming too oxidizing (in excess of 4 per cent $O_2$) because of the resultant excessive scale loss and perhaps actual "burning" of the steel by severe oxidation.

In conjunction with the control of this atmosphere it may be advisable, in cases where close control is necessitated, to install a continuously recording $CO_2$ meter. For all fuels there is a definite relation between the amount of $CO_2$ produced and the balance of the components of the atmosphere. Therefore, if the $CO_2$ content is known, the characteristics of the



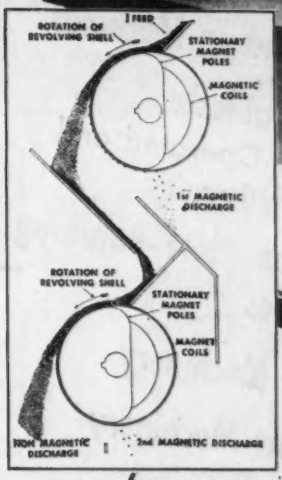

# DON'T

## *"Pay the Freight"*

## on Scrap that won't pass!

IF you are selling aluminum scrap it will pay you to buy the most efficient magnetic separator available. WLB permits smelters to reject entire shipments of scrap containing more then 1% iron. What's more, if you get all the iron out you get almost double the price for your scrap. For example, with *pure* aluminum chips selling at 3.5 cents per pound, those containing 1% iron are 1.8 cents per pound. On this basis a small Dings Separator with a capacity of 2000 lbs. per hour would make $34.00 per hour while operating.

There is a complete line of *high intensity* Dings Separators for every scrap separation job. The unit illustrated is the latest word in high capacity units. Write today for data, outlining your requirements.




**Dings Magnetic Separator Co.**

**516 E. Smith St., Milwaukee 7, Wis.**

*World's Largest Exclusive Builder of Magnetic Equipment*

**NEW**

The Dings Double Drum Separator illustrated above is a new, improved model offering many advantages for sharp, clean cut separation, includes a new, positive, forceful lubricating system and other features. Complete specifications on request.

*Left — Alnico Horseshoe Magnet. Very powerful. 2½" wide x 3" high. Pole bases ¾" x ¾".*

Dings MAGNETIC SEPARATION HIGH INTENSITY

atmosphere can be judged very readily.

### Conclusions

(1) There is a very definite need for controlling the atmosphere in an open-fired furnace, when heating alloy tool steels for forging or rolling, in order to control the amount of scale and decarburization produced.

(2) The two variables, which must be controlled in order to regulate the atmosphere within an open-fired furnace, are the ratio of air to fuel and the pressure within the furnace.

(3) A positive pressure must be maintained within the furnace to obtain control of the furnace atmosphere.

(4) A study of the actions of the various components and the actions of various combinations of these components comprising an open-fired furnace atmosphere, produces the conclusion that a slightly oxidizing atmosphere (up to 4 per cent $O_2$) will give the best results.

(5) The characteristics of open-fired furnace atmosphere can be judged by eye, but in cases where close control is necessitated, a continuous knowledge of the $CO_2$ content should provide the basis of control.

---

## *Basic Electric Furnace Steel*

(CONTINUED FROM PAGE 35)

cost for the metallic charge, and a power consumption considerably less than 250 kw-hr. and possibly as low as 150 kw-hr. per ton.

It is quite likely, therefore, that in the immediate postwar period a large tonnage of electric furnace carbon steel, and especially low alloy steel, will be made at a cost not exceeding $1 to $3 a ton more than comparable steels made in a cold melt open hearth plant. And if an electric furnace steel plant is favorably located with reference to a large consuming center, for example Detroit, and where extras are involved, as in alloy steels, it is likely that electric furnace steel can compete with open hearth steel solely on the basis of cost; and if conditions are especially favorable—either by having cheap hot metal available, or by having an ample supply of very cheap scrap, or, in an area where government power is available at less than 5 mills—electric furnace carbon and alloy steels can probably be made and sold more cheaply than the prod-

uct of the basic open hearth in the same general location.

At present approximately 65 per cent of the alloy steel production is melted and refined in the basic open hearth. This is due in large part to the $10 per ton premium on electric furnace steel. After the war when competition for available alloy steel business becomes keen, it is likely that this differential will be largely eliminated and consumers of alloy steel will have the choice between the product of the basic open hearth at X dollars a ton and basic electric furnace steel of essentially the same composition (but with lower sulphur) at X+2 to X+5 dollars per ton. And with a considerably lower price differential prevailing then than now, competition will be based primarily on quality factors.

### Quality

To claim that any specific electric furnace steel is of higher quality than a steel of the same composition made in an open hearth furnace is easy; to prove it is difficult because it is almost impossible to define quality precisely. As Frank Norris brings out clearly*, quality can be defined only in terms of intended use. "Steel of the best quality is the one that best meets the purpose for which it is intended. [It is] a consistently reproducible uniformity at a level determined by application and cost."

*"*Basic Open Hearth Steelmaking*", by the Physical Chemistry of Steelmaking Committee, American Institute of Mining and Metallurgical Engineers,* 1944, *p.* 342

### *Inherent Characteristics of the Basic Electric Furnace Process*

Any discussion of the quality of basic electric furnace steel must be based upon the inherent characteristics of melting and refining in the arc furnace. These have been well publicized ever since this process came into extended use, hence only a brief summation is necessary here. These characteristics include: (a) Almost unlimited heat input during melting and refining which is, however, under complete control; (b) furnace atmospheres and slags which are under close control and which reach equilibrium with the bath quickly; (c) almost complete sulphur elimination; (d) a degree of deoxidation that makes it possible to add alloying metals directly to the bath with little

loss; and (e) a relatively complete and rapid control of oxygen in slag and bath, and of the amount and character of the deoxidation products in the metal. None of these conditions is present in the basic open hearth furnace.

Assuming, therefore, that the furnace operator is skillful enough to take full advantage of these characteristics, electric furnace steel will be more uniform in composition, lower in sulphur, and cleaner than open hearth steel made to the same chemical specifications.

### *Quality Considerations for Special Steels*

For a large number of so-called special steels—including tool steels, heat and corrosion resistant steels, steels for ball and roller bearings, steels for some kinds of ordnance and for aircraft construction, and many others—where a high degree of uniformity in composition and structure and an almost complete absence of certain inclusions and harmful defects are desired, and where a price premium of a cent or even more a pound is not a major importance, the basic electric furnace process has been used almost exclusively for many years and will probably be used exclusively in the future. That these steels are nearly always melted and refined in the basic electric furnace is considered by many metallurgists as *prima facie* evidence of the superior quality of electric furnace steel.

What is meant, of course, is that for steels whose cost in the ingot is a small fraction of the cost of the finished product, a consistently reproducible uniformity in composition and structure, cleanness, and absence of harmful defects is much more important than a differential of a few cents a pound in first cost. There are, for example, a large number of products for which the cost of machining and heat treatment is 10 to 25 times the cost of the steel. Risking a premature failure by attempting to save a few cents a pound in the cost of the steel used is widely recognized as penny wise-pound foolish economy, and for such products the open hearth is not now and probably never will be a competitor of the basic electric furnace. These special steels, while important, are in the aggregate of minor consequence from a tonnage standpoint and will not be a large factor

in any possible postwar expansion of electric furnace steel.

### *Quality Considerations for Carbon and Low Alloy Steels*

The future field of expansion of the electric furnace in the steel industry is primarily in the medium carbon forging steels and in the low alloy NE and SAE steels. To compete in this important field the electric furnace plant must produce steels that will cost no more than comparable open hearth steels or that will be only slightly more costly and of demonstrably higher quality. If, in certain localities, electric furnace steel can be produced and sold at the same price as basic open hearth steel of the same composition, its future is assured.

In localities where electric furnace steel will cost appreciably more ($5 to $10 a ton) than a comparable open hearth material it will be necessary to demonstrate clearly that its superior quality more than justifies its higher cost. To do this obviously depends on the customer's requirements. So far as static and dynamic properties—tensile and yield strengths, elongation, reduction of area, impact resistance, and endurance limit—are concerned, it is impossible, at least with our present knowledge, to say that electric furnace steel is any better than open hearth steel of comparable composition. There is an exception to this, however, for properties affected by cleanness, such as transverse ductility. For example, it has long been the experience of the principal ordnance manufacturers that gun steels which must have high transverse elongation, reduction of area, and impact resistance could be made from forgings of electric furnace steel, whereas rejections were high if similar forgings were made from basic or acid open hearth steel.

As already pointed out, the most clearly demonstrable quality factors in favor of electric furnace carbon and low alloy steels are uniformity of chemical composition, low sulphur, and relative freedom from undesirable inclusions. Airplane propeller blade steel (SAE 4330) must contain less than 0.01 per cent sulphur to be welded satisfactorily by the atomic hydrogen process; steel with this sulphur content cannot be made regularly in the open hearth. Only steel made in the basic electric furnace can regularly meet the requirements for so-called airplane quality, and it is

**Summary of Estimated Costs for Open Hearth and Electric Furnace Steels**
**(Per net ton of ingots)**

| ITEM | Plain Carbon (1040) Steel | | Nickel-Chromium (3120) Steel | |
|---|---|---|---|---|
| | Open Hearth | Electric | Open Hearth | Electric |
| Net metallic charge | $21.22 | $19.52 | $30.65 | $28.86 |
| Fuel or power for melting | 1.56 | 4.20 | 1.87 | 4.90 |
| Electrodes | .... | 2.00 | .... | 2.62 |
| Fluxes | 0.34 | 0.34 | 0.38 | 0.85 |
| Refractories | 0.40 | 0.60 | 0.50 | 0.75 |
| Labor in melting dept. | 1.14 | 1.15 | 1.53 | 1.60 |
| Steam, water, fuel, power, misc. | 0.11 | 0.09 | 0.12 | 0.10 |
| Material for repairs | 0.15 | 0.15 | 0.18 | 0.18 |
| Molds and plates | 0.15 | 0.15 | 0.15 | 0.15 |
| Tools and supplies | 0.10 | 0.10 | 0.10 | 0.10 |
| Switching and crane | 0.10 | 0.10 | 0.10 | 0.10 |
| General plant services | 0.10 | 0.10 | 0.12 | 0.12 |
| Laboratory | 0.03 | 0.06 | 0.03 | 0.06 |
| Provisional funds | 0.75 | 0.80 | 1.00 | 1.10 |
| Miscellaneous general expense | 0.10 | 0.10 | 0.13 | 0.13 |
| Cost above metallic charge | $5.03 | $9.94 | $6.21 | $12.76 |
| Total ingot cost | 26.25 | 29.46 | 36.86 | 41.62 |
| Capital charge | 1.65 | 0.93 | 2.20 | 1.25 |
| Grand Total | $27.90 | $30.39 | $39.06 | $42.87 |

entirely possible that in low alloy steels the airplane quality of today will be the standard quality of tomorrow.

Moreover, and this is no wild prophesy, the recent but plainly evident trend toward narrower chemical analysis limits, and more rigid final inspection (macroetch, Magnaflux, etc.) for low alloy steels and for the medium carbon forging grades will continue, as will the trend to more hot topping; open hearth steel can undoubtedly meet these more rigid requirements but only by a marked increase in cost. The more restrictive the requirements become, the easier it is for electric furnace steel to compete on a price per pound basis.

### *Postwar Prospects*

In summary, therefore, it seems likely that in the first five to ten years after the war, basic electric furnace steel will hold its own without difficulty in the special steel field—in high carbon and alloy tool and die steels, in stainless and other high alloy grades, for certain kinds of ordnance (probably a large tonnage after the war), in aircraft, and some automotive steels, and for other highly specialized products. In carbon forging grades, and in low alloy steels any large encroachment of the basic electric into the field of the open hearth will depend upon how much it can reduce costs or, contrariwise, on how much the cost of open hearth steel will be raised by increasingly rigid customer requirements. The latter is important, and the trend is certainly in favor of electric furnace steel.

Finally, and this is also important, the inherent advantages of electric furnace steel just enumerated are the obvious ones; there undoubtedly will be others brought to light when the chemistry of electric furnace steelmaking is subjected to the same scrutiny as that given to the chemistry of the basic open hearth process. The Physical Chemistry of Steelmaking Committee of the American Institute of Mining and Metallurgical Engineers has, since its organization in 1927, changed basic open hearth practice from an art to an art and a science; electric furnace steelmaking is still a virgin field for study, and it seems safe to predict that when gas-slag-metal reactions in the electric furnace are as well understood as they are in the open hearth, new virtues will become evident for electric furnace steel that are not even suspected today.

# MACHINE TOOLS

*. . . News and Market Activities*

## Tool Builders Reduce Subcontracting

*Cleveland*

• • • **An attempt to size up** the subcontract situation in machine tool builders' shops concludes with the opinion that many builders are trying to get rid of as many war subcontracts as possible and that the portion of capacity presently being devoted to subcontracting runs the gamut from 40 to 95 per cent.

Some shops have even less capacity so devoted and are reported to be pressing what some call an "unfair" advantage by taking machine tool orders for 30 to 60 day delivery while other contractors, better equipped for war production, are faced with very extended deliveries in some cases. The underlying fear is that the more advantageously fixed tool builders will get the lead on automotive and other reconversion tool orders, thus sewing up a good portion of early postwar business.

The effort to rid tool builders' plants of now less desirable subcontracts for war projects is reflected in the tendency on the part of some builders to subcontract their subcontracts to other firms whose shops for one reason or another have idle capacity.

* * *

**Meanwhile,** the machine tool industry here reports some tentative orders being placed on the books for postwar (or WPB release) delivery. These have not been in large volume and cannot be considered firm orders as both delivery date and price have been left open to firming 90 days before delivery.

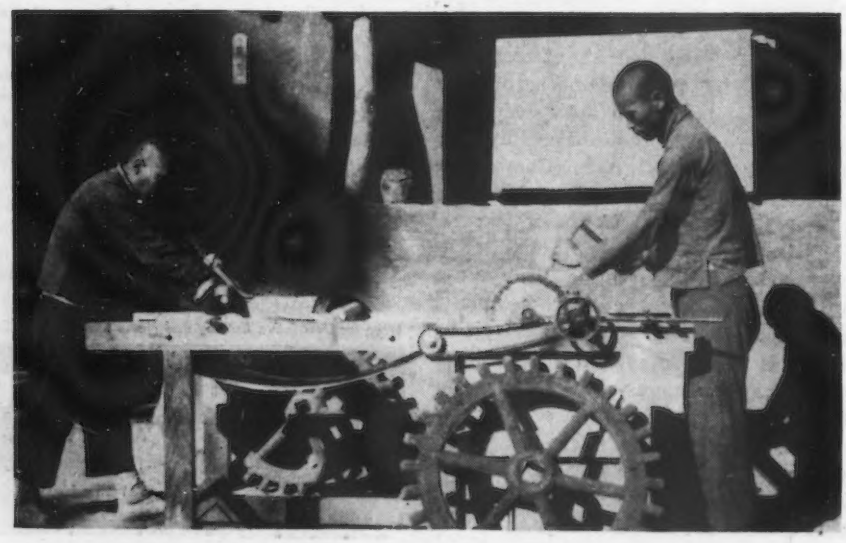
Some active selling efforts in this same direction are also being made by certain tool builders who have an eye on the potential reconversion market. A good many sales forces have been active in this manner for several months and neither tentative orders or promises are being received.

Questioned as to the value of orders which cannot be confirmed within any foreseeable time limit, the industry is inclined to believe that whether the orders actually materialize or not, the expression of interest in buying will act as a guide for sales forces which will tend to clear all possible business as soon as the word "go" is given. Many of the tentative orders have come in voluntarily from customers that wish to claim a place on what may be tightly filled schedules in the reconversion tooling program.

* * *

**The reason** all plants confronted with reconversion tooling needs are not rushing to place even tentative orders now is that a price reduction on tools is expected by some due to the sale of surplus machine tools. The industry does not share this view very heartily and states that machine tool prices are probably lower now than they would have been without price ceilings. The indications are that tools are being built at about the lowest figure feasible under existing labor and material costs. Consequently, price cutting on new machine tools despite surplus tool competition does appear likely.

**WOODEN MACHINE PARTS:** *Chinese workers operate a crude pattern-making machine for gears and other machine parts which are made of wood. Due to the shortage of iron, cooperative machine shops in China today turn out wooden textile machines that have only the most essential parts made of iron.*



## Bushings and Bearings Added to Price Order

*Washington*

• • • **Bearings and bushings** made of ferrous and non-ferrous metals have been added to the list of articles covered by provisions of the regulation establishing maximum prices for machines and parts and machinery services, OPA has announced. Effective July 1, the bearings and bushings were transferred from coverage by the GMPR because provisions of the machinery regulation are better adapted to pricing the items, OPA said. It was pointed out that the transfer of coverage will not affect the present general level of prices for the bearings and bushings, used in production of military items and industrial machinery.

Pipe and tube fittings subject to MPR 188 and ferrous and non-ferrous castings subject to Revised Price Schedule 41, MPR 125, or MPR 241 or 244, are not affected by this amendment.

## Aircraft Forgings Output

*Detroit*

• • • **Chevrolet Div. of** General Motors, second largest producer of aluminum aircraft forgings, has now turned out a total of 113,750,455 lb. of these parts, ranging from small engine components to 8 ft. propeller blades. Four plants of the division are devoted to this work.

Chevrolet has one foundry devoted to magnesium castings, which has turned out thus far approximately 3,000,000 lb. of parts for use in Pratt & Whitney aircraft engines.


# WHERE HAVE YOU HEARD THIS BEFORE?

*"How much?"*

Most folks have gotten out of the habit of asking about the price of things these days. Taxes and bond-buying notwithstanding, many people still have the feel of "ready money."

But cost-consciousness will be back. Then, the only answer for manufacturers will be:

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That's a sound combination any time . . . *today* as well as tomorrow. Here are two of the many R&M Hoists that can help you to make:

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The R & M Type F½ Hoist has 1000 — 2000-pound capacity. It is provided with pendent, push-button control. A step forward in improved design, better materials, and manufacturing economies that provide a better hoist at lower cost in both purchase price and operation.

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Houston . . . . 3715 Harrisburg Blvd.
Jacksonville . . . . . 305 Bisbee Bldg.
Kansas City, Mo. . . . . 215 Pershing
Los Angeles . . 149 W. Wash. Blvd.
Meriden, Conn. . . . 135 Colony St.
Newark . . . . . 700 Bergen St.
New York . . . . . 200 Varick St.
Philadelphia . . . . 401 N. Broad St.
Pittsburgh . . . . H. W. Oliver Bldg.
Providence . . . . . 44 Clifford St.
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# NON-FERROUS METALS

**. . . News and Market Activities**

## Stockpiles Imperil Metal Markets

• • • **The gigantic government-owned** stockpile of 57 metals and minerals was revealed by WPB last week to be 13,636,290,551 lb.

If Congress doesn't soon establish a sound policy for keeping many of these metals and minerals off the market, or for disposing of them in such a way as to prevent their being dumped upon the market, a long period of unemployment and the possibility of bankruptcy faces the metals industry, trade sources say.

Others insist that restrictions should be lifted, as in the case of aluminum and magnesium, and all but strategic reserves required by the Army and Navy sold as quickly as possible to prevent stockpiles from depressing prices for an indefinite period. For although the present administration might have sound stockpiling policies, future Congresses could reverse these policies and sell the stockpiles in a manner which would be ruinous to metals producers and lead to a general depression of all markets.

### U. S. Reserves of Metals and Minerals

July, 1944

| | Pounds |
|---|---|
| Aluminum (Refined) | 310,100,000 |
| Antimony Ore | 36,726,000 |
| Asbestos | 41,992,000 |
| Bauxite | 5,659,393,600 |
| Beryllium Ore | 7,478,000 |
| Bismuth | 905,871 |
| Cadmium | 1,672,326 |
| Chrome Ore | 2,103,501,760 |
| Cobalt (Ore and Oxide) | 2,226,000 |
| Cobalt-Nickel Compound | 89,650 |
| Columbite | 20,297 |
| Copper (Anode Scrap) | 3,560,000 |
| Copper (Refined and Blister) | 527,918,000 |
| Copper Ore | 310,734,000 |
| Corundum Ore | 2,768,000 |
| Cryolite Ore | 77,029,120 |
| Ferromanganese | 9,920,960 |
| Ferrovanadium | 1,288,386 |
| Fluorspar (Metallic and Acid grades) | 145,536,000 |
| Graphite | 15,706,000 |
| Iron (Carbonyl) | 299,675 |
| Lead (Bullion) | 68,000 |
| Lead (Refined) | 348,202,000 |
| Lead Ore | 11,966,000 |
| Manganiferous Ores | 13,095,040 |
| Manganese (Electrolytic) | 400,000 |
| Manganese Ore | 2,146,936,960 |
| Mercury | 5,858,308 |
| Mica (Amber Phlogopite Block) | 127,463 |
| Mica (Muscovite Block) | 6,151,310 |
| Mica (Amber Phlogopite Splittings) | 288,639 |
| Molybdenite | 4,418,000 |
| Monazite Sand | 6,376,000 |
| Nickel (Copper Refinery Residues) | 1,445,435 |
| Nickel (Refined) | 1,702,000 |
| Quartz Crystals | 5,465,906 |
| Rutile Ore | 4,460,000 |
| Talc | 192,000 |
| Tantalite | 778,468 |
| Tin (Reclaimed) | 2,022,720 |
| Tin (Refined) | 89,116,160 |
| Tin Ore | 235,350,080 |
| Tin Oxide | 1,785,280 |
| Tungsten Ore | 38,160,000 |
| Vanadium (Concentrates) | 3,396,000 |
| Vanadium (Lead Vanadate Ores) | 2,242,000 |
| Zinc (Concentrates and Ore) | 1,023,380,000 |
| Zinc (Metal) | 393,362,000 |
| Zinc Sulphide) | 30,874,000 |
| | **Troy Ounces** |
| Iridium | 2,453 |
| Osmiridium | 49 |
| Osmium | 85 |
| Palladium | 174 |
| Platinum | 58,763 |
| Rhodium | 105 |
| Ruthenium | 21 |

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## Mercury Production Closing Down

• • • **The War Production Board** recently dropped mercury and mercury bearing ore from Strategic Materials List No. 2. This is the first time since the inception of official lists of strategic materials in 1921 that mercury has not been so designated. It reflects the success of the program conducted by Metals Reserve Co. to bring into production domestic marginal mines and to foster importation from Canada and Mexico.

The price of mercury has dropped rapidly ever since the termination of the domestic buying program at the end of January. Last week mercury was selling at New York for $97 to $103 per flask, depending on quantity, as compared with the Metals Reserve floor price of $192 per flask at New York that has been in effect from April 1942. Even while government buying was in progress, the market price dropped below the Metals Reserve price after producers of more than 90 flasks per month were excluded from the benefits of the program when it became apparent that stocks of mercury were building up faster than was desirable. Purchases were limited to 300 flasks per year from any producer. Conservation restrictions were removed by WPB in February 1944.

Mercury started a rapid rise in price in 1939 due to its requirement for war programs. It had reached a price of $200 a flask when ceilings of $191, Pacific Coast, and $199, New York, were established in February 1942. In 1943 mercury was used principally for chemicals and pharmaceuticals, as a catalyst, for electrical apparatus, industrial and control instruments, anti-fouling paint and agriculture.

In building up its stockpile for the war, the Metals Reserve Co. made purchases of mercury from Canada and Mexico. Mexican mercury was recently quoted at $95 per flask f.o.b. Laredo, Tex., U. S. duty of $19 per flask unpaid. This price, however, is not competitive with the present domestic market. British purchase of mercury from Spain by barter has been reported at $250 per flask, a rate established by the European price fixing cartel.

Our mines for the most part are located in California, Nevada, Oregon, and Arkansas. They do not compare with the mines of Spain and Italy in richness of ore and could not compete with their production if, as in the past, the operation of the cartel and our high tariff had not permitted domestic production. There were 176 operating mines before the termination of the Metals Reserve Agency.

Metallic Mercury in the U. S. in Flasks of 76 lb.

*Bureau of Mines*

| | Production | Consumption | Import | Export |
|---|---|---|---|---|
| 1939 | 18,633 | 20,900 | 3,499 | 1,208 |
| 1940 | 37,777 | 26,800 | 171 | 9,617 |
| 1941 | 44,921 | 44,800 | 7,740 | 2,590 |
| 1942 | 50,846 | 49,700 | ..... | ..... |
| 1943 | 53,300 | 54,500 | ..... | ..... |
| 1944 (to May) | 19,100 | 17,000 | ..... | ..... |

Mercury Price Ranges—New York in dollars per flask

| | High | Low |
|---|---|---|
| 1938 | $ 83 | $ 70 |
| 1939 | 165 | 77 |
| 1940 | 205 | 157 |
| 1941 | 205 | 162 |
| 1942 | 210 | 194 |
| 1943 | 198 | 190 |

## REFINER, SMELTER PRICES

*(Cents per lb. unless otherwise noted)*

| | |
|---|---|
| Aluminum, 99+%, del'd | 15.00 |
| Aluminum, No. 12 Fdy., (No. 2) | 12.00 |
| Aluminum, deoxidizing grades | 11.00 to 12.25 |
| Antimony, Asiatic, New York | Nominal |
| Antimony, American, f.o.b. Laredo, Tex. | 14.50 |
| Arsenic, prime white, 99% | 4.00 |
| Brass, 85-5-5-5 ingots (No. 115) | 13.00 |
| Cadmium, del'd | 90.00 |
| Cobalt, 97-99% (dollars per lb.) | $2.11 |
| Copper, electro, Conn. Valley | 12.00 |
| Copper, electro, New York | 11.75 |
| Copper, lake | 12.00 |
| Copper, beryllium, 3.75-4.25% Be; dollars per lb. contained Be | $15.00 |
| Gold, U. S. Treas., dollars per oz. | $35.00 |
| Indium, 99.5%, dollars per troy oz. | $7.50 |
| Iridium, dollars per troy oz. | $165.00 |
| Lead, St. Louis | 6.35 |
| Lead, New York | 6.50 |
| Magnesium, 99.9+%, carlots | 20.50 |
| Magnesium, 12-in. sticks, carlots | 30.00 |
| Mercury, dollars per 76-lb. flask, f.o.b. New York | $103 to $105.00 |
| Nickel, electro | 35.00 |
| Palladium, dollars per troy oz. | $24.00 |
| Platinum, dollars per oz. | $35.00 |
| Silver, open market, New York, cents per oz. | 44.75 |
| Tin, Straits, New York | 52.00 |
| Zinc, East St. Louis | 8.25 |
| Zinc, New York | 8.67 |

### Copper, Copper Base Alloys

*(Mill base, cents per lb.)*

| | Extruded Shapes | Rods | Sheets |
|---|---|---|---|
| Copper | 20.87 | .... | 20.87 |
| Copper, H.R. | .... | 17.37 | .... |
| Copper, drawn | .... | 18.37 | .... |
| Low brass, 80% | .... | 20.40 | 20.15 |
| High brass | .... | .... | 19.48 |
| Red brass, 85% | .... | 20.61 | 20.36 |
| Naval brass | 20.37 | 19.12 | 24.50 |
| Brass, free cut | .... | 15.01 | .... |
| Commercial bronze, 90% | .... | 21.32 | 21.07 |
| Commercial bronze, 95% | .... | 21.53 | 21.28 |
| Manganese bronze | 24.00 | .... | 28.00 |
| Phos. bronze, A, B, 5% | .... | 36.50 | 36.25 |
| Muntz metal | 20.12 | 18.37 | 22.75 |
| Everdur, Herculoy, Olympic or equal | .... | 25.50 | 26.00 |
| Nickel silver, 5% | .... | 28.75 | 26.50 |
| Architect bronze | 19.12 | .... | .... |

### Aluminum

*(Cents per lb., subject to extras on gage, size, temper, finish, factor number, etc.)*

*Tubing:* 2 in. O.D. x 0.065 in. wall 2S, 40c. (½H); 52S, 61c. (O); 24S, 67½c. (T).

*Plate:* 0.250 in. and heavier; 2S and 3S, 21.2c.; 52S, 24.2c.; 61S, 22.8c.; 24S, 24.2c.

*Flat Sheet:* 0.188 in. thickness; 2S and 3S, 22.7c. a lb.; 52S, 26.2c.; 61S, 24.7c.; 24S, 26.7c.

2000-lb. base for tubing; 30,000-lb. base for plate, flat stock.

*Extruded Shapes:* "As extruded" temper; 2000-lb. base, 2S and 3S, factor No. 1 to 4, 25.5c.; 14S, factor No. 1 to 4, 35c.; 17S, factor No. 1 to 4, 31c.; 24S, factor No. 1 to 4, 34c.; 53S, factor No. 1 to 4, 28c.; 61S, factor No. 1 to 4, 28½c.

The factor is determined by dividing perimeter of shape by weight per lineal foot.

*Wire Rod and Bar:* Base price; 17ST and 11ST-3, screw machine stock. Rounds: ¼ in., 28½c. per lb.; ½ in., 26c.; 1 in., 24½c.; 2 in., 23c. Hexagonals; ¼ in., 34½c. per lb.; ½ in., 28½c.; 1 in., 25½c.; 2 in., 25½c. 2S, as fabricated, random or standard lengths, ¼ in., 24c. per lb.; ½ in., 25c.; 1 in., 24c.; 2 in., 23c. 24ST, rectangles and squares, random or standard lengths. 0.093-0.187 in. thick by 1.001-2.000 in. wide, 33c. per lb.; 0.751-1.500 in. thick by 2.001-4.000 in. wide, 29c.; 1.501-2.000 in. thick by 4.001-6.000 in. wide, 27½c.

### Magnesium

Sheet, rod, tubes, bars, extruded shapes subject to individual quotations. Metal turnings: 100 lb. or more, 46c. a lb.; 25 to 90 lb., 56c.; less than 25 lb., 66c.

## NON-FERROUS SCRAP METAL QUOTATIONS

*(OPA basic maximum prices, cents per lb., f.o.b. point of shipment, subject to quality, quantity and special preparation premiums)*

### Copper, Copper Base Alloys

***OPA Group 1***

| | |
|---|---|
| No. 1 wire, No. 1 heavy copper | 9.75 |
| No. 1 tinned copper wire, No. 1 tinned heavy copper | 9.75 |
| No. 2 wire, mixed heavy copper | 8.75 |
| Copper tuyeres | 8.75 |
| Light copper | 7.75 |
| Copper borings | 9.75 |
| No. 2 copper borings | 8.75 |
| Lead covered copper wire, cable | 6.00* |
| Lead covered telephone, power cable | 6.04 |
| Insulated copper | 5.10* |

***OPA Group 2***

| | |
|---|---|
| Bell metal | 15.50 |
| High grade bronze gears | 13.25 |
| High grade bronze solids | 11.50* |
| Low lead bronze borings | 11.50* |
| Babbitt lined brass bushings | 13.00 |
| High lead bronze solids | 10.00* |
| High lead bronze borings | 10.00* |
| Red trolley wheels | 10.75 |
| Tinny (phosphor bronze) borings | 10.50 |
| Tinny (phosphor bronze) solids | 10.50 |
| Copper-nickel solids and borings | 9.25 |
| Bronze paper mill wire cloth | 9.50 |
| Aluminum bronze solids | 9.00 |
| Soft red brass (No. 1 composition) | 9.00 |
| Soft red brass borings (No. 1) | 9.00 |
| Gilding metal turnings | 8.50 |
| Contaminated gilded metal solids | 8.50 |
| Unlined standard red car boxes | 8.25 |
| Lined standard red car boxes | 7.75 |
| Cocks and faucets | 7.75 |
| Mixed brass screens | 7.75 |
| Red brass breakage | 7.50 |
| Old nickel silver solids, borings | 6.25 |
| Copper lead solids, borings | 6.25 |
| Yellow brass castings | 6.25 |

***OPA Group 3***

| | |
|---|---|
| Yellow brass soft sheet clippings | 8.625 |
| Yellow rod brass turnings | 8.375 |
| Zincy bronze borings | 8.00 |
| Zincy bronze solids | 8.00 |
| Fired rifle shells | 8.25 |
| Brass pipe | 7.50 |
| Old rolled brass | 7.00 |
| Admiralty condenser tubes | 7.50 |
| Muntz metal condenser tubes | 7.00 |
| Plated brass sheet, pipe reflectors | 6.50 |
| Manganese bronze solids | 7.25[1] |
| Manganese bronze solids | 6.25[2] |
| Manganese bronze borings | 6.50[1] |
| Manganese bronze borings | 5.50[2] |

***OPA Group 4***

| | |
|---|---|
| Automobile radiators | 7.00 |

***OPA Group 5***

| | |
|---|---|
| Refinery brass | 5.00* |

*Price varies with analysis. [1] Lead content 0.00 to 0.40 per cent. [2] Lead content 0.41 to 1.00 per cent.

### Other Copper Alloys

| | |
|---|---|
| Briquetted Cartridge Brass Turnings | 8.625 |
| Cartridge Brass Turnings, Loose | 7.875 |
| Loose Yellow Brass Trimmings | 7.875 |

### Aluminum

***Plant scrap, segregated***

| | |
|---|---|
| All S-type alloys (except 2S) | 8.50 |
| 2S solids | 8.00 |
| High grade alloys | 7.00 |
| Low grade alloys | 6.50 |
| Borings and turnings | |
| High grade alloys | 5.50 |
| Low grade alloys | 5.00 |

***Plant scrap, mixed***

| | |
|---|---|
| All solids | 6.00 |
| Borings and turnings | 4.00 |

***Obsolete scrap***

| | |
|---|---|
| Pure cable | 8.00 |
| Old sheet and utensils | 7.00 |
| Old castings and forgings | 6.50 |
| Pistons, free of struts | 6.50 |
| Pistons, with struts | 4.50 |
| Old alloy sheet | 5.50 |

For old castings and forgings, pistons, sheets, add ½c. lb. for lots 1000 to 19,999 lb.; for other scrap add 1c.; for lots over 19,999 lb. add 1½c. a lb.

### Magnesium

***Segregated plant scrap***

| | |
|---|---|
| Pure solids and all other solids, exempt | |
| Boring and turnings | 8.00 |

***Mixed, contaminated plant scrap***

| | |
|---|---|
| Grade 1 solids | 11.00 |
| Grade 1 borings and turnings | 7.00 |
| Grade 2 solids | 9.00 |
| Grade 2 borings and turnings | 5.00 |

For lots over 1499 lb. add 1c. per lb.

### Zinc

| | |
|---|---|
| New zinc clippings, trimmings | 7.25 |
| Engravers' lithographers plates | 7.25 |
| Old zinc scrap | 5.75 |
| Unsweated zinc dross | 5.80 |
| Die cast slab | 5.80 |
| New die cast scrap | 4.95 |
| Radiator grilles, old and new | 4.95 |
| Old die cast scrap | 4.50 |

### Lead

Deduct 0.55c. a lb. from refined metal basing point prices or soft and hard lead inc. cable, for f.o.b. point of shipment price.

### Nickel

Ni content 98+%, Cu under ½%, 26c. per lb.; 90 to 98% Ni, 26c. per lb. contained Ni.

## ELECTROPLATING ANODES AND CHEMICALS

***Anodes***

*(Cents per lb., f.o.b. shipping point)*

| | |
|---|---|
| Copper: Cast, elliptical, 15 in. and longer | 25⅛ |
| Electrolytic, full size | 22⅞ |
| cut to size | 30⅛ |
| Rolled, oval, straight, 15 in. and longer | 23¼ |
| Curved | 24¼ |
| Brass: Cast, 82-20, elliptical, 15 in. and longer | 23⅝ |
| Zinc: Cast, 99.99, 16 in. and over | 16¼ |
| Nickel: 99% plus, cast | 47 |
| Rolled, depolarized | 48 |
| Silver: Rolled, 999 fine per Troy (1-9) oz., per oz. | 58 |

***Chemicals***

*(Cents per lb., delivery from New York)*

| | |
|---|---|
| Copper cyanide, tech., 100-lb. bbls. 1-5 | 5.65 |
| Copper sulphate, 99.5 crystals, bbls. | 13.00–13.50 |
| Nickel salts, single, 425-lb. bbls. | 34.00 |
| Silver cyanide, 100 oz., lots | 40.82–41.125 |
| Sodium cyanide, 96% dom., 100-lb. dms. | 0.15 |
| Zinc cyanide, 100-lb. dms. | 33.00 |
| Zinc, sulphate, 89% crystals, bbls. | 6.80 |

# SCRAP

**. . . News and Market Activities**

## Reconversion Aids Market

• • • **Two important factors** are in competition to dominate markets throughout the country, and the scrap market is no exception. Until recently, expectation of an early conclusion of the European war had constrained steel mills to limit their inventories to the minimum scrap purchases required for their immediate production requirements. Buying in this way, mills are in a position to minimize inventory losses in a falling market which can be expected to follow widespread cancellation of war production contracts.

Compensating factors which under normal circumstances would tend to control such limitations of purchase are no longer effective. Under maximum price regulations there is no need for mills to anticipate a major price rise while scrap of most grades is selling at or near ceilings. Nor is there real need, despite manpower shortages in the yards, to anticipate shortage of scrap supplies while WPB stands ready to allocate scrap to mills.

Events this week in Japan and Germany have had a further retarding effect on the market. Political upsets within the Axis have stirred hopes for the end of the war to such an extent that dealers and mills anticipate sudden and precipitous price reductions. Therefore yards are discouraging collectors with poor offers. But prices remain at or near ceilings for most grades since yards are short and need not lower prices to improve volume. Mills have little desire to buy and are therefore not attempting to force down prices.

On the other hand steps are now being taken by most government agencies to organize and expedite reconversion of industry to the production of civilian requirements at the earliest possible time. It has been estimated that with the expanded rate of production at which our industry is operating, a cutback in war production of 35 per cent would permit production sufficient to permit satisfaction of all our civilian needs. The first evidence of this new trend is to be found in Detroit where producers of automotive sheet are expected to begin the accumulation of inventories of carbon steel scrap. Present supplies of this material are limited.

•

*Washington*

The first increase in total inventories since December, 1943, stocks of iron and steel scrap at plants of consumers, suppliers and producers at the end of May, 1944, approximated 5,966,000 gross tons, an increase of nearly 1 per cent over the 5,932,000 reported on April 30, this year, according to the Bureau of Mines. Consumers' stocks on May 31 amounted to 4,794,000 tons, compared with 4,768,000 tons at the end of April, while the combined stocks of suppliers and producers were 1,172,000 tons and 1,164,000 tons on the same dates. The Bureau said that an increase of 42,000 tons in the stocks of home scrap was the major factor in the gain in total stocks, since consumers' stocks of purchased scrap declined 16,000 tons while suppliers' and producers' inventories increased 8000 tons. Stocks of purchased scrap at the end of May totaled 4,531,000 tons and stocks of home scrap aggregated 1,435,000 tons.

Pig iron stocks at the end of May rose to 1,480,000 the highest since the end of February, when a similar supply was on hand. The gain over the end of April was 19,000 tons.

Consumption of scrap and pig iron also showed an increase in May rising to a total of 4,683,000 tons of scrap and 4,659,000 tons of pig iron. The scrap consumption consisted of 2,015,000 tons of purchased and 2,668,000 tons of home scrap. April scrap consumption amounted to 4,629,000 tons of which 1,972,000 tons were purchased and 2,657,000 tons were home scrap. Pig iron consumption in April totaled 4,608,000 tons.

•

*CHICAGO*—Demand for open hearth material continues steady, but the Chicago market otherwise is quiet. Some combination deals are in evidence with mills insisting on delivery of larger proportionate quantities of heavy melting steel in combination with less desirable grades for which ceiling prices would not ordinarily be paid. The market price for blast furnace grades is undetermined in view of the lack of steady demand. Despite sales of small amounts of short shoveling turnings at one dollar less than ceiling, the going price may still be considered at two dollars below ceiling.

*NEW YORK*—Mills in this area are buying available scrap steadily. Open hearth grades are moving at ceiling prices, but blast furnace grades and turnings are selling at about $1 below ceiling. The shortage of manpower in yards is limiting the accumulation and preparation of scrap.

•

*PHILADELPHIA*—All mills in this district except one are still holding up scrap orders. Open hearth grades are particularly slow moving. However, there are some indications that one or two consumers may ease the situation next week by resuming purchases. At the price of $1.25 below ceiling, turnings have a good demand. Cast continues easy to move while small quantities of low phos are sold at not more than $1 above heavy melting prices.

•

*BUFFALO*—Dealers with large inventories are beginning to scan the European war news in earnest. While most yards are not heavily stocked, some dealers are candid about being fearful of loss. Nevertheless, mills continue to buy, and the first boat in the resumption of downlake scrap shipments has arrived. One dealer has received a quantity of German light battlefield scrap, part of which has already vanished from his yard as souvenirs. Whole German tanks containing much heavy scrap will arrive shortly and be processed by a dealer, probably for the area's largest consumer. Blowing out of a stack this week is likely to increase local scrap demand slightly.

•

*CLEVELAND*—If possible, the market is quieter here than last week. Very few new orders have originated during July, and shipments on old contracts are small. The most prominent blast furnace has dropped out of the market temporarily, but may return within a few weeks. Shipments of No. 1 and 2 steel are going to the Valley, but all buying is close to the belt. Prices remain fairly steady except for alloys which are begging for buyers. The flow of scrap is very poor as yards cannot take on much miscellaneous material due to manpower shortages. Turnings are also reported coming out of plants more slowly.

•

*DETROIT*—One eye cocked on the recent meeting of automobile company presidents with the WPB in Washington, some dealers who supply scrap to mills producing automotive sheet and other requirements in normal times are beginning to expect that soon these mills will start to build substantial inventories of alloy free scrap. Good quality carbon steel scrap will be a necessity for mills producing automobile sheet when the passenger car industry reconverts to civilian production. Scrap with residual alloys impairs the deep drawing qualities of sheet; but alloy free scrap is not easy to find. Mills are accepting all scrap of this type coming their way, but only scattered instances are known in the trade where it is being actively sought and perhaps stockpiled. Reserves of carbon

# . . . SCRAP PRICES

## Prices of Railroad Scrap, Per Gross Ton

| BASING POINT | No. 1 and 2 RR. Hvy. Melt. Steel; Wrought Iron and Soft Steel; No. 2 Steel Wheels; Axles, Iron and All Steel; Uncut Bolsters and Side Frames | Uncut Frogs and Switches | No. 1 Bushel | No. 1 Turnings | No. 2 Bushel; Iron Arch Bars, Steel Arch Bars; Boilers, Fireboxes and Tanks; Flues, Tubes and Pipes; Lined Iron and Steel; Struct. Wrought Iron and Steel, Uncut; Destroyed Cars and Locomotive Tenders | No. 1 Sheet Scrap | No. 2 Turnings, Drillings and Borings | No. 2 Sheet Scrap | Scrap Rails in Random Lengths | Iron Arch Bars, 3 ft. and Under | Reroll Rails;* Cut Rails, 3 ft. and Under; Cast Steel, No. 1; Uncut Tires; Cut Bolsters and Side Frames; Angle and Splice Bars | No. 3 Steel Wheels; Spring Steel; Couplers and Knuckles | Cut Rails, 18-in. and Under | Cut Tires | Solid Steel Axles |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pittsburgh, Brackenridge, Butler, Canton, Johnstown, Midland, Sharon, Steubenville, Monessen, Warren, Weirton, Youngstown | $21.00 | $20.50 | $20.00 | $19.50 | $17.50 | $16.00 | $15.00 | $14.00 | $21.50 | $22.00 | $23.50 | $24.50 | $24.75 | $25.50 | $27.00 |
| Cleveland, Cincinnati, Ashland, Middletown, Portsmouth | 20.50 | 20.00 | 19.50 | 19.00 | 17.00 | 15.50 | 14.50 | 13.50 | 21.00 | 21.50 | 23.00 | 24.00 | 24.25 | 25.00 | 26.50 |
| Buffalo | 20.25 | 19.75 | 19.25 | 18.75 | 16.75 | 15.25 | 14.25 | 13.25 | 20.75 | 21.25 | 22.75 | 23.75 | 24.00 | 24.75 | 26.25 |
| Chicago, Sparrows Point, Coatesville, Conshohocken, Claymont, Phoenixville, Harrisburg | 19.75 | 19.25 | 18.75 | 18.25 | 16.25 | 14.75 | 13.75 | 12.75 | 20.25 | 20.75 | 22.25 | 23.25 | 23.50 | 24.25 | 25.75 |
| Bethlehem, Kokomo | 19.25 | 18.75 | 18.25 | 17.75 | 15.75 | 14.25 | 13.25 | 12.25 | 19.75 | 20.25 | 21.75 | 22.75 | 23.00 | 23.75 | 25.25 |
| Duluth | 19.00 | 18.50 | 18.00 | 17.50 | 15.50 | 14.00 | 13.00 | 12.00 | 19.50 | 20.00 | 21.50 | 22.50 | 22.75 | 23.50 | 25.00 |
| Detroit | 18.85 | 18.35 | 17.85 | 17.35 | 15.35 | 13.85 | 12.85 | 11.85 | 19.35 | 19.85 | 21.35 | 22.35 | 22.60 | 23.35 | 24.85 |
| St. Louis | 18.50 | 18.00 | 17.50 | 17.00 | 15.00 | 13.50 | 12.50 | 11.50 | 19.00 | 19.50 | 21.00 | 22.00 | 22.25 | 23.00 | 24.50 |
| Birmingham, Los Angeles, Pittsburg (Cal.), Alabama City (Ala.), San Francisco, Atlanta | 18.00 | 17.50 | 17.00 | 16.50 | 14.50 | 13.00 | 12.00 | 11.00 | 18.50 | 19.00 | 20.50 | 21.50 | 21.75 | 22.50 | 24.00 |
| Minnequa, Colo. | 17.50 | 17.00 | 16.50 | 16.00 | 14.00 | 12.50 | 11.50 | 10.50 | 18.00 | 18.50 | 20.00 | 21.00 | 21.25 | 22.00 | 23.50 |
| Seattle | 15.50 | 15.00 | 14.50 | 14.00 | 12.00 | 10.50 | 9.50 | 8.50 | 16.00 | 16.50 | 18.00 | 19.00 | 19.25 | 20.00 | 21.50 |

* When purchased or sold for re-rolling. Otherwise price shall be that of "Scrap rails in random lengths."

**ON-LINE OR SHIPPING POINT PRICES:** The term "on-line prices" means the maximum prices that the originating railroad may charge for scrap delivered to a consumer on the line of the railroad. The on-line price of scrap originating from an operating road operating in a basing point shall be the price established for the scrap at the highest priced basing point in which the railroad operates. The maximum on-line price of any grade of steel scrap originating from an operating railroad not operating in a basing point shall be the price established for the scrap at the most favorable basing point, minus the foreign line proportion of the lowest established rail charge from the accumulation point to such basing point. No operating railroad not operating in a basing point may sell or offer to sell iron and steel scrap to a consumer or his broker without approval from OPA, unless there is filed with OPA a statement showing how prices were determined.

Maximum on-line or shipping point prices of steel scrap originating from non-operating railroads shall be the price at the most favorable basing point minus the lowest charge for transporting scrap by rail from accumulation point to such basing point. Where non-operating railroads are located with a basing point, appropriate switching charge deductions will be applicable.

**DELIVERED PRICES:** The maximum delivered price of scrap originating from an operating railroad and delivered to a consumer's plant located on the line shall be the maximum on-line price. Delivered to consumers located off the line of the railroad by rail, vessel, or combinations, the price will be the on-line price plus the foreign line proportion of the through rate from shipping to consuming point via the junction nearest such plant in terms of transportation charges, or the commercial rate from such nearest junction to the consumers plan unless off-line routing at another point is directed by order of a governmental agency. The railroad seller may not participate in the transportation charges incurred in off-line delivery unless the maximum on-line price is reduced accordingly.

When delivered to a consumer from a non-operating railroad, the delivered price shall be the maximum price at the most favorable basing point plus transportation charges to delivery point. Such prices shall be computed in the same manner and subject to the same limitations as the charges allowable for dealer or industrial scrap with the same intransit preparation provision except that the springboard limitations shall not apply to Scrap Rails, Re-rolling Rails, or Cut Rails. Railroad scrap prepared by a dealer or moving through a yard (except for unprepared scrap prepared in-transit) or sold by any other person than a railroad shall be classified and priced as industrial or dealer scrap except for certain specified grades. For these the maximum shipping point and delivered prices shall be the same as those established for non-operating railroads.

**PREPARATION CHARGES:** Maximum fees chargeable (per gross ton) for in-transit preparation of iron and steel scrap of railroad origin have been established. For preparing scrap into the following grades, the fees shown are allowable:

No. 1 or 2 Railroad Heavy Melting, $3.50.
No. 1 or 2 Sheet Bundles, $4.00.
Cut Rails, 3 ft. and Under, $2.00.
Cut Rails, 18-in. and Under, $3.25.
Cut Tires, $2.00.
Cut Bolsters and Side Frames, $2.50.

scrap to anticipate a call on the mills for automobile sheet are virtually non-existent, so far as the trade knows. In the light of some feeling in Detroit that automobile production may not be too far away, a start of such stockpiling is being anticipated by some far-sighted members of the trade.

•

*BIRMINGHAM*—The largest consumer of open hearth grades in this area is no longer equalizing freight on No. 1 or No. 2 steel. In other words, it is paying the OPA base price delivered for these two grades. For No. 2 black bundles and No. 3 galvanized bundles, the price delivered is actually $1 below the base price. There has been no change in the delivered price for blast furnace grades since there is a firm market for this type of material. Cast grades continue to move at restricted freight rates in some instances, and foundry grades remain a drug on the market.

## New Division for Packard

*Detroit*

• • • **Establishment of a separate division in the Toledo plant of the Packard Motor Car Co. "to handle advanced aircraft engine development at the specific request of the Army Air Forces Material Command" was announced recently by Geo. T. Christopher, president of Packard.**

**His statement followed the news that the Defense Plant Corp. had just increased its contract $1,350,000 with Packard for additional facilities at the Toledo plant, bringing the total to $8,750,000.**

# Comparison of Prices . . .

Advances Over Past Week in Heavy Type; Declines in *Italics*. [Prices Are F.O.B. Major Basing Points]

| Flat Rolled Steel: (Cents Per Lb.) | July 25, 1944 | July 18, 1944 | June 20, 1944 | July 27, 1943 |
|---|---|---|---|---|
| Hot rolled sheets | 2.10 | 2.10 | 2.10 | 2.10 |
| Cold rolled sheets | 3.05 | 3.05 | 3.05 | 3.05 |
| Galvanized sheets (24 ga.) | 3.50 | 3.50 | 3.50 | 3.50 |
| Hot rolled strip | 2.10 | 2.10 | 2.10 | 2.10 |
| Cold rolled strip | 2.80 | 2.80 | 2.80 | 2.80 |
| Plates | 2.10 | 2.10 | 2.10 | 2.10 |
| Plates, wrought iron | 3.80 | 3.80 | 3.80 | 3.80 |
| Stain's c.r. strip (No. 302) | 28.00 | 28.00 | 28.00 | 28.00 |
| **Tin and Terne Plate: (Dollars Per Base Box)** | | | | |
| Tin plate, standard cokes | $5.00 | $5.00 | $5.00 | $5.00 |
| Tin plate, electrolytic | 4.50 | 4.50 | 4.50 | 4.50 |
| Special coated mfg. ternes | 4.30 | 4.30 | 4.30 | 4.30 |
| **Bars and Shapes: (Cents Per Lb.)** | | | | |
| Merchant bars | 2.15 | 2.15 | 2.15 | 2.15 |
| Cold finished bars | 2.65 | 2.65 | 2.65 | 2.65 |
| Alloy bars | 2.70 | 2.70 | 2.70 | 2.70 |
| Structural shapes | 2.10 | 2.10 | 2.10 | 2.10 |
| Stainless bars (No. 302) | 24.00 | 24.00 | 24.00 | 24.00 |
| Wrought iron bars | 4.40 | 4.40 | 4.40 | 4.40 |
| **Wire and Wire Products: (Cents Per Lb.)** | | | | |
| Plain wire | 2.60 | 2.60 | 2.60 | 2.60 |
| Wire nails | 2.55 | 2.55 | 2.55 | 2.55 |
| **Rails: (Dollars Per Gross Ton)** | | | | |
| Heavy rails | $40.00 | $40.00 | $40.00 | $40.00 |
| Light rails | 40.00 | 40.00 | 40.00 | 40.00 |
| **Semi-Finished Steel: (Dollars Per Gross Ton)** | | | | |
| Rerolling billets | $34.00 | $34.00 | $34.00 | $34.00 |
| Sheet bars | 34.00 | 34.00 | 34.00 | 34.00 |
| Slabs, rerolling | 34.00 | 34.00 | 34.00 | 34.00 |
| Forging billets | 40.00 | 40.00 | 40.00 | 40.00 |
| Alloy blooms, billets, slabs | 54.00 | 54.00 | 54.00 | 54.00 |
| **Wire Rods and Skelp: (Cents Per Lb.)** | | | | |
| Wire rods | 2.00 | 2.00 | 2.00 | 2.00 |
| Skelp | 1.90 | 1.90 | 1.90 | 1.90 |

| Pig Iron: (Per Gross Ton) | July 25, 1944 | July 18, 1944 | June 20, 1944 | July 27, 1943 |
|---|---|---|---|---|
| No. 2 fdy., Philadelphia | $25.84 | $25.84 | $25.84 | $25.89 |
| No. 2, Valley furnace | 24.00 | 24.00 | 24.00 | 24.00 |
| No. 2, Southern Cin'ti | 25.11 | 25.11 | 25.11 | 24.68 |
| No. 2, Birmingham | 20.38 | 20.38 | 20.38 | 20.38 |
| No. 2, foundry, Chicago† | 24.00 | 24.00 | 24.00 | 24.00 |
| Basic, del'd eastern Pa. | 25.34 | 25.34 | 25.34 | 25.39 |
| Basic, Valley furnace | 23.50 | 23.50 | 23.50 | 23.50 |
| Malleable, Chicago† | 24.00 | 24.00 | 24.00 | 24.00 |
| Malleable, Valley | 24.00 | 24.00 | 24.00 | 24.00 |
| L. S. charcoal, Chicago | 37.34 | 37.34 | 37.34 | 31.34 |
| Ferromanganese‡ | 135.00 | 135.00 | 135.00 | 135.00 |

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.
‡For carlots at seaboard.

| Scrap: (Per Gross Ton) | | | | |
|---|---|---|---|---|
| Heavy melt'g steel, P'gh. | $20.00 | $20.00 | $20.00 | $20.00 |
| Heavy melt'g steel, Phila. | 18.75 | 18.75 | 18.75 | 18.75 |
| Heavy melt'g steel, Ch'go | 18.75 | 18.75 | 18.75 | 18.75 |
| No. 1 hy. comp. sheet, Det. | 17.85 | 17.85 | 17.85 | 17.85 |
| Low phos. plate, Youngs'n | 22.50 | 22.50 | 22.50 | 22.50 |
| No. 1 cast, Pittsburgh | 20.00 | 20.00 | 20.00 | 20.00 |
| No. 1 cast, Philadelphia | 20.00 | 20.00 | 20.00 | 20.00 |
| No. 1 cast, Ch'go | 20.00 | 20.00 | 20.00 | 20.00 |
| **Coke, Connellsville: (Per Net Ton at Oven)** | | | | |
| Furnace coke, prompt | $7.00 | $7.00 | $7.00 | $6.50 |
| Foundry coke, prompt | 8.25 | 8.25 | 8.25 | 7.50 |
| **Non-Ferrous Metals: (Cents per Lb. to Large Buyers)** | | | | |
| Copper, electro., Conn. | 12.00 | 12.00 | 12.00 | 12.00 |
| Copper, Lake | 12.00 | 12.00 | 12.00 | 12.00 |
| Tin (Straits), New York | 52.00 | 52.00 | 52.00 | 52.00 |
| Zinc, East St. Louis | 8.25 | 8.25 | 8.25 | 8.25 |
| Lead, St. Louis | 6.35 | 6.35 | 6.35 | 6.35 |
| Aluminum, Virgin, del'd. | 15.00 | 15.00 | 15.00 | 15.00 |
| Nickel, electrolytic | 35.00 | 35.00 | 35.00 | 35.00 |
| Magnesium, ingot | 20.50 | 20.50 | 20.50 | 20.50 |
| Antimony (Asiatic), N. Y. | 16.50 | 16.50 | 16.50 | 16.50 |

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 141-153.

# Composite Prices . . .

Starting with the issue of April 22, 1943, the weighted finished steel price index was revised for the years 1941, 1942 and 1943. See explanation of the change on page 90 of the April 22, 1943, issue.

| | FINISHED STEEL | PIG IRON | SCRAP STEEL |
|---|---|---|---|
| July 18, 1944 | 2.25513c. a Lb. | $23.61 a Gross Ton | $19.17 a Gross Ton |
| One week ago | 2.25513c. a Lb. | $23.61 a Gross Ton | $19.17 a Gross Ton |
| One month ago | 2.25513c. a Lb. | $23.61 a Gross Ton | $19.17 a Gross Ton |
| One year ago | 2.26190c. a Lb. | $23.61 a Gross Ton | $19.17 a Gross Ton |

| | HIGH | LOW | HIGH | LOW | HIGH | LOW |
|---|---|---|---|---|---|---|
| 1943 | 2.25513c., | 2.25513c., | $23.61 | $23.61 | $19.17 | $19.17 |
| 1942 | 2.26190c., | 2.26190c., | 23.61 | 23.61 | 19.17 | 19.17 |
| 1941 | 2.43078c., | 2.43078c., | $23.61, Mar. 20 | $23.45, Jan. 2 | $22.00, Jan. 7 | $19.17, Apr. 10 |
| 1940 | 2.30467c., Jan. 2 | 2.24107c., Apr. 16 | 23.45, Dec. 23 | 22.61, Jan. 2 | 21.83, Dec. 30 | 16.04, Apr. 9 |
| 1939 | 2.35367c., Jan. 3 | 2.26689c., May 16 | 22.61, Sept. 19 | 20.61, Sept. 12 | 22.50, Oct. 3 | 14.08, May 16 |
| 1938 | 2.58414c., Jan. 4 | 2.27207c., Oct. 18 | 23.25, June 21 | 19.61, July 6 | 15.00, Nov. 22 | 11.00, June 7 |
| 1937 | 2.58414c., Mar. 9 | 2.32263c., Jan. 4 | 23.25, Mar. 9 | 20.25, Feb. 16 | 21.92, Mar. 30 | 12.67, June 8 |
| 1936 | 2.32263c., Dec. 28 | 2.05200c., Mar. 10 | 19.74, Nov. 24 | 18.73, Aug. 11 | 17.75, Dec. 21 | 12.67, June 9 |
| 1935 | 2.07642c., Oct. 1 | 2.06492c., Jan. 8 | 18.84, Nov. 5 | 17.83, May 14 | 13.42, Dec. 10 | 10.33, Apr. 29 |
| 1934 | 2.15367c., Apr. 24 | 1.95757c., Jan. 2 | 17.90, May 1 | 16.90, Jan. 27 | 13.00, Mar. 13 | 9.50, Sept. 25 |
| 1933 | 1.95578c., Oct. 3 | 1.75836c., May 2 | 16.90, Dec. 5 | 13.56, Jan. 3 | 12.25, Aug. 8 | 6.75, Jan. 3 |
| 1932 | 1.89196c., July 5 | 1.83901c., Mar. 1 | 14.81, Jan. 5 | 13.56, Dec. 6 | 8.50, Jan. 12 | 6.43, July 5 |
| 1931 | 1.99626c., Jan. 13 | 1.86586c., Dec. 29 | 15.90, Jan. 6 | 14.79, Dec. 15 | 11.33, Jan. 6 | 8.50, Dec. 29 |
| 1930 | 2.25488c., Jan. 7 | 1.97319c., Dec. 9 | 18.21, Jan. 7 | 15.90, Dec. 16 | 15.00, Feb. 18 | 11.25, Dec. 9 |
| 1929 | 2.31773c., May 28 | 2.26498c., Oct. 29 | 18.71, May 14 | 18.21, Dec. 17 | 17.58, Jan. 29 | 14.08, Dec. 3 |

Weighted index based on steel bars, beams, tank plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 per cent of the United States output. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

# . . . Prices of Finished Iron and Steel

Steel prices shown here are f.o.b. basing points, in cents per lb., unless otherwise indicated. Extras apply. Delivered prices do not reflect 3% tax on freight. (1) Mill run sheet, 10c. per lb. under base; primes 25c. above base. (2) Unassorted 8-lb. coating. (3) Widths up to 12-in. (4) 0.25 carbon and less. (5) Applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producer to consumer. Discount of 25c. per 100 lb. to fabricators. (8) Also shafting. For quantities of 20,000 to 29,999 lb. (9) Carload lot in manufacturing trade. (10) Prices do not apply if rail and water is not used. (12) Boxed. (13) Portland and Seattle price, San Francisco 2.50c. (14) This base price for annealed, bright finish wires, commercial spring wire.

| Basing Point → / Product ↓ | Pittsburgh | Chicago | Gary | Cleveland | Birmingham | Buffalo | Youngstown | Sparrows Point | Granite City | Middletown, Ohio | Gulf Ports, Cars | Provo, Utah | 10 Pacific Ports, Cars | DELIVERED TO Detroit | New York | Philadelphia |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hot Rolled Sheets | 2.10¢ | 2.10¢ | 2.10¢ | 2.10¢ | 2.10¢ | 2.10¢ | 2.10¢ | 2.10¢ | 2.20¢ | 2.10¢ | | | 2.65¢ | 2.20¢ | 2.34¢ | 2.27¢ |
| Cold Rolled Sheets[1] | 3.05¢ | 3.05¢ | 3.05¢ | 3.05¢ | | 3.05¢ | 3.05¢ | | 3.15¢ | 3.05¢ | | | 3.70¢ | 3.15¢ | 3.30¢ | 3.37¢ |
| Galv. Sheets (24 gage) | 3.50¢ | 3.50¢ | 3.50¢ | | 3.50¢ | 3.50¢ | 3.50¢ | 3.50¢ | 3.60¢ | 3.50¢ | | | 4.05¢ | | 3.74¢ | 3.67¢ |
| Enameling Sheets (20 gage) | 3.35¢ | 3.35¢ | 3.35¢ | 3.35¢ | | | 3.35¢ | | 3.45¢ | 3.35¢ | | | 4.06¢ | 3.45¢ | 3.71¢ | 3.67¢ |
| Long Ternes[2] | 3.80¢ | 3.80¢ | 3.80¢ | | | | | | | | | | 4.55¢ | | 4.16¢ | 4.12¢ |
| Hot Rolled Strip[3] | 2.10¢ | 2.10¢ | 2.10¢ | 2.10¢ | 2.10¢ | | 2.10¢ | | | 2.10¢ | | | 2.75¢ | 2.20¢ | 2.46¢ | |
| Cold Rolled Strip[4] | 2.80¢ | 2.90¢ | | 2.80¢ | | | 2.80¢ | (Worcester = 3.00¢) | | | | | | 2.90¢ | 3.16¢ | |
| Cooperage Stock Strip | 2.20¢ | 2.20¢ | | | 2.20¢ | | 2.20¢ | | | | | | | | 2.56¢ | |
| Commodity C-R Strip | 2.95¢ | 3.05¢ | | 2.95¢ | | | 2.95¢ | (Worcester = 3.35¢) | | | | | | 3.05¢ | 3.31¢ | |
| Coke Tin Plate, Base Box | $5.00 | $5.00 | $5.00 | | | | | | $5.10 | | | | | | 5.36¢ | 5.32¢ |
| .50 / .75 Electro Tin Plate, Box | $4.50 / $4.65 | $4.50 | $4.50 / $4.65 | | | | | | $4.60 / $4.75 | | | | | | | |
| Black Plate (29 gage)[5] | 3.95¢ | 3.05¢ | 3.05¢ | | | | | | 3.15¢ | | | | 4.05¢[13] | | | 3.37¢ |
| Mfg. Ternes, Special Box | $4.30 | $4.30 | $4.30 | | | | | | $4.40 | | | | | | | |
| Carbon Steel Bars | 2.15¢ | 2.15¢ | 2.15¢ | 2.15¢ | 2.15¢ | 2.15¢ | | (Duluth = 2.25¢) | | | 2.50¢ | | 2.80¢ | 2.25¢ | 2.49¢ | 2.47¢ |
| Rail Steel Bars[6] | 2.15¢ | 2.15¢ | 2.15¢ | 2.15¢ | 2.15¢ | 2.15¢ | | | | | 2.50¢ | | 2.80¢ | | | |
| Reinforcing (Billet) Bars[7] | 2.15¢ | 2.15¢ | 2.15¢ | 2.15¢ | 2.15¢ | 2.15¢ | 2.15¢ | 2.15¢ | | | 2.50¢ | | 2.55¢[13] | 2.25¢ | 2.39¢ | |
| Reinforcing (Rail) Bars[7] | 2.15¢ | 2.15¢ | 2.15¢ | 2.15¢ | 2.15¢ | 2.15¢ | 2.15¢ | | | | 2.30¢ | | 2.55¢[13] | 2.25¢ | | 2.47¢ |
| Cold Finished Bars[8] | 2.65¢ | 2.65¢ | 2.65¢ | 2.65¢ | | 2.65¢ | | | (Detroit = 3.70¢) | | (Toledo = 2.80¢) | | | | 2.99¢ | 2.97¢ |
| Alloy Bars, Hot Rolled | 2.70¢ | 2.70¢ | | | | 2.70¢ | (Bethlehem, Massillon, Canton = 2.70¢) | | | | | | | 2.80¢ | | |
| Alloy Bars, Cold Drawn | 3.35¢ | 3.35¢ | 3.35¢ | 3.35¢ | | 3.35¢ | | | | | | | | 3.45¢ | | |
| Carbon Steel Plates | 2.10¢ | 2.10¢ | 2.10¢ | 2.10¢ | 2.10¢ | | 2.10¢ | (Coatesville and Claymont = 2.10¢) 2.10¢ | 2.35¢ | | 2.45¢ | 2.60¢ | 2.65¢ | 2.33¢ | 2.29¢ | 2.15¢ |
| Floor Plates | 3.35¢ | 3.35¢ | | | | | | | | | 3.70¢ | | 4.00¢ | | 3.71¢ | 3.67¢ |
| Alloy Plates | 3.50¢ | 3.50¢ | | | (Coatesville = 3.50¢) | | | | | | 3.95 | | 4.15¢ | | 3.70¢ | 3.89¢ |
| Structural Shapes | 2.10¢ | 2.10¢ | 2.10¢ | | 2.10¢ | 2.10¢ | (Bethlehem = 2.10¢) | | | | 2.45¢ | | 2.75¢ | | 2.27¢ | 2.215¢ |
| SPRING STEEL, C-R 0.26 to 0.50 Carbon | 2.80¢ | | | 2.80¢ | | | (Worcester = 3.00¢) | | | | | | | | | |
| 0.51 to 0.75 Carbon | 4.30¢ | | | 4.30¢ | | | (Worcester = 4.50¢) | | | | | | | | | |
| 0.76 to 1.00 Carbon | 6.15¢ | | | 6.15¢ | | | (Worcester = 6.35¢) | | | | | | | | | |
| 1.01 to 1.25 Carbon | 8.35¢ | | | 8.35¢ | | | (Worcester = 8.55¢) | | | | | | | | | |
| Bright Wire[14] | 2.60¢ | 2.60¢ | | 2.60¢ | 2.60¢ | | (Worcester = 2.70¢) | | (Duluth = 2.65¢) | | | | 3.10¢ | | | 2.92¢ |
| Galvanized Wire | Add proper size extra and galvanizing extra to Bright Wire base. | | | | | | | | | | | | | | | |
| Spring (High Carbon) | 3.20¢ | 3.20¢ | | 3.20¢ | | | (Worcester = 3.30¢) | | | | | | 3.70¢ | | | 3.53¢ |
| Steel Sheet Piling | 2.40¢ | 2.40¢ | | | | 2.40¢ | | | | | | | 2.95¢ | | | 2.73¢ |

EXCEPTIONS TO PRICE SCHED. NO. 6

**Slabs**—Andrews Steel Co. $41 basing pts.; Wheeling Steel Corp. $34 Portsmouth, Ohio; Empire Sheet & Tin Plate Corp. $41; Phoenix Iron Co. (rerolling) $41, (forging) $47; Granite City Steel $47.50.

**Blooms**—Phoenix Iron Co. (rerolling) $41, (forging) $47; Pgh. Steel Co. (reroll) $38.25, (forging) $44.25.

**Sheet Bar**—Empire Sheet & Tin Plate Co. $39 mill; Wheeling Steel Corp. $38 Portsmouth, Ohio.

**Billets, Forging**—Andrews Steel Co. $50 basing pts.; Follansbee Steel Corp. $49.50 Toronto; Phoenix Iron Co. $47.00 mill. Geneva Steel Co. $64.64 f.o.b. Pacific Coast; Pittsburgh Steel Co. $49.50.

**Billets, Rerolling**—Continental Steel Corp. may charge Acme Steel in Chicago switching area $34 plus freight from Kokomo, Ind.; Northwestern Steel & Wire Co. (Lend-Lease) $41 mill; Wheeling Steel Corp. (small) $36 Portsmouth, Ohio; (blooming mill sizes) applicable base, f.o.b. Portsmouth, Ohio; Stanley Works may sell Washburn Wire Co. under allocation at $39 Bridgeport, Conn.; Keystone Steel & Wire Co. may sell Acme Steel Co. at Chicago base, f.o.b. Peoria; Phoenix Iron Co. $41 mill; Continental Steel Corp. (1¾ x 1¾) $39.50, (2 x 2) $40.60 Kokomo, Ind. (these prices include $1 size extra); Keystone Steel & Wire Co. $36.40 Peoria; Connors Steel Co. $50.69 Birmingham; Ford Motor Co. $34 Dearborn, Mich. Geneva Steel Co. $58.64 f.o.b. Pac. C. Pgh. Steel Co. $43.50.

**Structural Shapes**—Phoenix Iron Co. $2.35 basing pts. (export) $2.50 Phoenixville; Knoxville Iron Co. $2.30 basing points.

**Bar Size Shapes**—(Angles) W. Ames & Co., 10 tons or over, $3.10 mill.

**Rails**—Sweet Steel Co. (rail steel) $50 mill; West Virginia Rail Co. (lightweight) on allocation based Huntington, W. Va.; Colorado Fuel & Iron Corp., $45 Pueblo.

**Hot Rolled Plate**—Granite City Steel Co. $2.65 mill; Knoxville Iron Co. $2.25 basing pts.; Kaiser Co. and Geneva Steel Co. $3.20 Pacific Ports; Central Iron & Steel Co. $2.50 basing points; Granite City Steel Co. $2.35 Granite City.

**Merchant Bars**—W. Ames Co., 10 tons and over, $2.85 mill; Eckels-Nye Steel Corp., $2.50 basing pts. (rail steel) $2.40; Phoenix Iron Co. $2.40 basing pts.; Sweet Steel Co. (rail steel) $2.35 mill; Joslyn Mfg. & Supply Co., $2.35 Chicago; Calumet Steel Dic., Borg Warner Corp. (8 in. mill bars) $2.35 Chicago; Knoxville Iron Co. $2.30 basing pts. Laclede Steel Co., sales to LaSalle Steel granted Chicago base, f.o.b. Madison, Ill. Milton Mfg. Co. $2.75 f.o.b. Milton, Pa.

Logan Iron and Steel Co., Burnham, Pa., wrought iron bars, Grade I, $7.90 per 100 lb. f.o.b. plant. Ceiling is $7.40 per 100 lb.

**Reinforcing Bars**—W. Ames & Co., 10 tons and over, $2.85 mill; Sweet Steel Co. (rail steel) $2.35 mill; Columbia Steel Co. $2.50 Pacific Ports.

**Cold Finished Bars**—Keystone Drawn Steel Co. on allocation, Pittsburgh c.f. base plus c/l freight on hot rolled bars Pittsburgh to Spring City, Pa.; New England Drawn Steel Co. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to Massfield, Mass., f.o.b. Massfield; Empire Finished Steel Corp. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to plants f.o.b. plant; Compressed Steel Shafting Co. on allocation outside New England, Buffalo base plus c/l freight ville; Medart Co. in certain areas, Chi- Buffalo to Readville, Mass. f.o.b. Readcago c.f. base plus c/l freight Chicago to St. Louis, f.o.b. St. Louis.

**Alloy Bars**—Texas Steel Co. for delivery except Texas and Okla. Chicago base, f.o.b. Fort Worth, Tex.; Connors Steel Co. shipped outside Ala., Mississippi, Louisiana, Georgia, Florida, Tenn., Pittsburgh base, f.o.b. Birmingham.

**Hot Rolled Strip**—Joslyn Mfg. & Supply Co. $2.30 Chicago; Knoxville Iron Co. $2.25 basing pts.

**Hot Rolled Sheets**—Andrews Steel Co., Middletown base on shipments to Detroit or area; Parkersburg Iron & Steel Co., $2.25 Parkersburg.

**Galvanized Sheets**—Andrews Steel Co., $3.75 basing pts.; Parkersburg Iron & Steel Co. $3.85 Parkersburg; Apollo Steel Co. $3.75 basing pts.; Continental Steel Co., Middletown base on Kokomo, Ind., product; Superior Sheet Steel Co., Pittsburgh base except for Lend-Lease.

**Pipe and Tubing**—South Chester Tube Co. when priced at Pittsburgh, freight to Gulf Coast and Pacific Ports may be charged from Chester, Pa., also to points lying west of Harrisburg, Pa.

**Black Sheets**—Empire Sheet and Tinplate Co., maximum base price mill is $2.45 per 100 lb., with differentials, transportation charges, etc., provided in RPS. No. 6.

## WAREHOUSE PRICES

*Delivered metropolitan areas per 100 lb. These are zoned warehouse prices in conformance with latest zoning amendments to OPA Price Schedule 49.*

| Cities | SHEETS | | | STRIP | | Plates ¼ in. and heavier | Structural Shapes | BARS | | ALLOY BARS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Hot Rolled (10 gage) | Cold Rolled | Galvanized (24 gage) | Hot Rolled | Cold Rolled | | | Hot Rolled | Cold Finished | Hot Rolled, NE 8617-20 | Hot Rolled, NE 9442-45 Ann. | Cold Drawn, NE 8617-20 | Cold Drawn, NE 9442-45 Ann. |
| **Philadelphia | 3.518 | 4.872[8] | 5.018[a] | 3.922 | 4.772 | 3.605 | 3.668 | 3.822 | 4.072 | 5.966 | 7.066 | 7.272 | 8.322 |
| New York | 3.590 | 4.613[3] | 5.010 | 3.974[6] | 4.772 | 3.768 | 3.758 | 3.853 | 4.103 | 6.068 | 7.108 | 7.303 | 8.353 |
| Boston | 3.744 | 4.744[9] | 5.224[9] | 4.106 | 4.715 | 3.912 | 3.912 | 4.044 | 4.144 | 6.162 | 7.262 | 7.344 | 8.394 |
| Baltimore | 3.394 | 4.852 | 4.894 | 3.902 | 4.752 | 3.594 | 3.759 | 3.802 | 4.052 | .... | .... | .... | .... |
| Norfolk | 3.771 | 4.965 | 5.371 | 4.165 | 4.865 | 3.971 | 4.002 | 4.065 | 4.165 | .... | .... | .... | .... |
| Chicago | 3.25 | 4.20 | 5.231 | 3.60 | 4.65[17] | 3.55 | 3.55 | 3.50 | 3.75 | 5.75 | 6.85 | 6.85 | 7.90 |
| Milwaukee | 3.387 | 4.337[3] | 5.272[4] | 3.737 | 4.787[17] | 3.687 | 3.687 | 3.637 | 3.887 | 5.987 | 7.087 | 7.087 | 8.137 |
| Cleveland | 3.35 | 4.40 | 4.877[4] | 3.60 | 4.45 | 3.40 | 3.588 | 3.35 | 3.75 | 5.956 | 7.056 | 6.85 | 7.90 |
| Buffalo | 3.35 | 4.40 | 4.75[4] | 3.819 | 4.669 | 3.63 | 3.40 | 3.35 | 3.75 | 5.75 | 6.85 | 6.85 | 7.90 |
| Detroit | 3.45 | 4.50 | 5.00[4] | 3.70 | 4.65[17] | 3.609 | 3.661 | 3.45 | 3.80 | 6.08 | 7.18 | 7.159 | 8.209 |
| Cincinnati | 3.425 | 4.475[3] | 4.825[5] | 3.675 | 4.711 | 3.611 | 3.691 | 3.611 | 4.011 | .... | .... | .... | .... |
| St. Louis | 3.397 | 4.347[3] | 5.172[4] | 3.747 | 4.931[17] | 3.697 | 3.697 | 3.647 | 4.031 | 6.131 | 7.231 | 7.231 | 8.281 |
| Pittsburgh | 3.35 | 4.40 | 4.75 | 3.60 | 4.45 | 3.40 | 3.40 | 3.35 | 3.75 | 5.75 | 6.85 | 6.85 | 7.90 |
| St. Paul | 3.51 | 4.46 | 5.257[4] | 3.86 | 4.35[17] | 3.81[13] | 3.81[13] | 3.76[13] | 4.361 | 6.09 | 7.19 | 7.561 | 8.711 |
| Omaha | 3.865 | 5.443 | 5.608[4] | 4.215 | .... | 4.165 | 4.165 | 4.115 | 4.43 | .... | .... | .... | .... |
| Indianapolis | 3.58 | 3.58 | 4.568 | 4.918 | 3.768 | 4.78 | 3.63 | 3.58 | 3.98 | 6.08 | 7.18 | 7,18 | 8.23 |
| Birmingham | 3.45 | .... | 4.75 | 3.70 | .... | 3.55 | 3.55 | 3.50 | 4.43 | .... | .... | .... | .... |
| Memphis | 3.965[7] | 4.66 | 3.265 | 4.215 | .... | 4.065 | 4.065 | 4.015 | 4.33 | .... | .... | .... | .... |
| New Orleans | 4.058* | 4.95 | 5.358 | 4.308 | .... | 4.158 | 4.158* | 4.108* | 4.629 | .... | .... | .... | .... |
| Houston | 3.763 | 5.573 | 6.313[1] | 4.313 | .... | 4.25 | 4.25 | 3.75 | 6.373[3] | 7.223 | 8.323 | 8.323 | 9.373 |
| Los Angeles | 5.00 | 7.20[3] | 6.10[4] | 4.95 | 5.613[15] | 4.95 | 4.65 | 4.40 | 5.583 | 8.304 | 9.404 | 9.404 | 10.454 |
| San Francisco | 4.55[14] | 7.30[4] | 6.35[4] | 4.50[14] | 7.333[17] | 4.65[14] | 4.35[14] | 4.15[14] | 5.333 | 8.304 | 9.404 | 9.404 | 10.454 |
| Seattle | 4.65[12] | 7.05[4] | 5.95[4] | 4.25[12] | .... | 4.75[12] | 4.45[12] | 4.35[12] | 5.783 | .... | 9.404 | .... | .... |
| Portland | 4.65[11] | 6.60[4] | 5.75[4] | 4.75[11] | .... | 4.75[11] | 4.45[11] | 4.45[11] | 5.533 | 8.304 | 9.404 | 8.304 | 9.404 |
| Salt Lake City | 4.53[17] | .... | 6.17[18] | 5.53[17] | .... | 4.98[17] | 4.98[17] | 4.88[17] | 5.90 | .... | .... | .... | .... |

## NATIONAL EMERGENCY (N. E.) STEELS
### *(Hot Rolled Mill Extras for Alloy Content)*

| Designation | CHEMICAL COMPOSITION LIMITS, PER CENT | | | | | | | | Basic Open-Hearth | | Electric Furnace | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Carbon | Manganese | Phosphorus Max. | Sulphur Max. | Silicon | Chromium | Nickel | Molybdenum | Bars and Bar-Strip | Billets, Blooms and Slabs | Bars and Bar-Strip | Billets, Blooms and Slabs |
| NE 1330 | .28/ .33 | 1.60/1.90 | .040 | .040 | .20/ .35 | | | | .10c | $2.00 | | |
| NE 1335 | .33/ .38 | 1.60/1.90 | .040 | .040 | .20/ .35 | | | | .10 | 2.00 | | |
| NE 1340 | .38/ .43 | 1.60/1.90 | .040 | .040 | .20/ .35 | | | | .10 | 2.00 | | |
| NE 1345 | .43/ .48 | 1.60/1.90 | .040 | .040 | .20/ .35 | | | | .10 | 2.00 | | |
| NE 1350 | .48/ .53 | 1.60/1.90 | .040 | .040 | .20/ .35 | | | | .10 | 2.00 | | |
| NE 8613 | .12/ .17 | .70/ .90 | .040 | .040 | .20/ .35 | .40/ .60 | .40/ .70 | .15/ .25 | .65 | 13.00 | 1.25c | $25.00 |
| NE 8615 | .13/ .18 | .70/ .90 | .040 | .040 | .20/ .35 | .40/ .60 | .40/ .70 | .15/ .25 | .65 | 13.00 | 1.25 | 25.00 |
| NE 8617 | .15/ .20 | .70/ .90 | .040 | .040 | .20/ .35 | .40/ .60 | .40/ .70 | .15/ .25 | .65 | 13.00 | 1.25 | 25.00 |
| NE 8620 | .18/ .23 | .70/ .90 | .040 | .040 | .20/ .35 | .40/ .60 | .40/ .70 | .15/ .25 | .65 | 13.00 | 1.25 | 25.00 |
| NE 8630 | .28/ .33 | .70/ .90 | .040 | .040 | .20/ .35 | .40/ .60 | .40/ .70 | .15/ .25 | .65 | 13.00 | 1.25 | 25.00 |
| NE 8635 | .33/ .38 | .75/1.00 | .040 | .040 | .20/ .35 | .40/ .60 | .40/ .70 | .15/ .25 | .65 | 13.00 | 1.25 | 25.00 |
| NE 8637 | .35/ .40 | .75/1.00 | .040 | .040 | .20/ .35 | .40/ .60 | .40/ .70 | .15/ .25 | .65 | 13.00 | 1.25 | 25.00 |
| NE 8640 | .38/ .43 | .75/1.00 | .040 | .040 | .20/ .35 | .40/ .60 | .40/ .70 | .15/ .25 | .65 | 13.00 | 1.25 | 25.00 |
| NE 8642 | .40/ .45 | .75/1.00 | .040 | .040 | .20/ .35 | .40/ .60 | .40/ .70 | .15/ .25 | .65 | 13.00 | 1.25 | 25.00 |
| NE 8645 | .43/ .48 | .75/1.00 | .040 | .040 | .20/ .35 | .40/ .60 | .40/ .70 | .15/ .25 | .65 | 13.00 | 1.25 | 25.00 |
| NE 8650 | .48/ .53 | .75/1.00 | .040 | .040 | .20/ .35 | .40/ .60 | .40/ .70 | .15/ .25 | .65 | 13.00 | 1.25 | 25.00 |
| NE 8720 | .18/ .23 | .70/ .90 | .040 | .040 | .20/ .35 | .40/ .60 | .40/ .70 | .20/ .30 | .70 | 14.00 | 1.30 | 26.00 |
| NE 9255 | .50/ .60 | .70/ .95 | .040 | .040 | 1.80/2.20 | | | | .40 | 8.00 | | |
| NE 9260 | .55/ .65 | .70/1.00 | .040 | .040 | 1.80/2.20 | | | | .40 | 8.00 | | |
| NE 9261 | .55/ .65 | .70/1.00 | .040 | .040 | 1.80/2.20 | .10/ .25 | | | .65 | 13.00 | | |
| NE 9262 | .55/ .65 | .70/1.00 | .040 | .040 | 1.80/2.20 | .25/ .40 | | | .65 | 13.00 | | |
| NE 9415 | .13/ .18 | .80/1.10 | .040 | .040 | .20/ .35 | .30/ .50 | .30/ .60 | .08/ .15 | .75 | 15.00 | 1.25 | 25.00 |
| NE 9420 | .18/ .23 | .80/1.10 | .040 | .040 | .20/ .35 | .30/ .50 | .30/ .60 | .08/ .15 | .75 | 15.00 | 1.25 | 25.00 |
| NE 9422 | .20/ .25 | .80/1.10 | .040 | .040 | .20/ .35 | .30/ .50 | .30/ .60 | .08/ .15 | .75 | 15.00 | 1.25 | 25.00 |
| NE 9425 | .23/ .28 | .80/1.10 | .040 | .040 | .20/ .35 | .30/ .50 | .30/ .60 | .08/ .15 | .75 | 15.00 | 1.25 | 25.00 |
| NE 9430 | .28/ .33 | .90/1.20 | .040 | .040 | .20/ .35 | .30/ .50 | .30/ .60 | .08/ .15 | .75 | 15.00 | 1.25 | 25.00 |
| NE 9435 | .33/ .38 | .90/1.20 | .040 | .040 | .20/ .35 | .30/ .50 | .30/ .60 | .08/ .15 | .75 | 15.00 | 1.25 | 25.00 |
| NE 9437† | .35/ .40 | .90/1.20 | .040 | .040 | .20/ .35 | .30/ .50 | .30/ .60 | .08/ .15 | .75 | 15.00 | 1.25 | 25.00 |
| NE 9440 | .38/ .43 | .90/1.20 | .040 | .040 | .20/ .35 | .30/ .50 | .30/ .60 | .08/ .15 | .75 | 15.00 | 1.25 | 25.00 |
| NE 9442 | .40/ .45 | 1.00/1.30 | .040 | .040 | .20/ .35 | .30/ .50 | .30/ .60 | .08/ .15 | .80 | 16.00 | 1.30 | 26.00 |
| NE 9445 | .43/ .48 | 1.00/1.30 | .040 | .040 | .20/ .35 | .30/ .50 | .30/ .60 | .08/ .15 | .80 | 16.00 | 1.30 | 26.00 |
| NE 9450 | .48/ .53 | 1.20/1.50 | .040 | .040 | .20/ .35 | .30/ .50 | .30/ .60 | .08/ .15 | .80 | 16.00 | 1.30 | 26.00 |
| NE 9537* | .35/ .40 | 1.20/1.50 | .040 | .040 | .40/ .60 | .40/ .60 | .40/ .70 | .15/ .25 | 1.20 | 24.00 | 1.70 | 34.00 |
| NE 9540* | .38/ .43 | 1.20/1.50 | .040 | .040 | .40/ .60 | .40/ .60 | .40/ .70 | .15/ .25 | 1.20 | 24.00 | 1.70 | 34.00 |
| NE 9542* | .40/ .45 | 1.20/1.50 | .040 | .040 | .40/ .60 | .40/ .60 | .40/ .70 | .15/ .25 | 1.20 | 24.00 | 1.70 | 34.00 |
| NE 9545* | .43/ .48 | 1.20/1.50 | .040 | .040 | .40/ .60 | .40/ .60 | .40/ .70 | .15/ .25 | 1.20 | 24.00 | 1.70 | 34.00 |
| NE 9550* | .48/ .53 | 1.20/1.50 | .040 | .040 | .40/ .60 | .40/ .60 | .40/ .70 | .15/ .25 | 1.20 | 24.00 | 1.70 | 34.00 |

*Recommended for large sections only. Note: The extras shown are in addition to a base price of 2.70c. per 100 lb., on finished products and $54 per gross ton on semi-finished steel major basing points and are in cents per 100 lb. and dollars per gross ton in semi-finished. When acid open-hearth is specified and acceptable add to basic open hearth alloy differential 0.25c. per lb. for bars and bar strip, $5.00 per gross ton for billets, blooms and slabs. The ranges shown above are restricted to sizes 100 sq. in. or less or equivalent cross sectional area 18 in. wide or under with a max. individual piece weight of 7000 lb.

### Base Quantities

*Standard unless otherwise keyed on prices.*

**HOT ROLLED:** Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

**COLD ROLLED:** Sheets, 400 to 1499 lb.; strip, extras on all quantities; bars, 1500 lb. base; NE alloy bars, 1000 to 39,999 lb.

**EXCEPTIONS:** (1) 150 to 499 lb. (2) 150 to 1499 lb. (3) 400 to 1499 lb. (4) 450 to 1499 lb. (5) 500 to 1499 lb. (6) 0 to 1999 lb. (7) 400 to 1999 lb. (8) 1000 to 1999 lb. (9) 450 to 3749 lb. (10) 400 to 3999 lb. (11) 300 to 4999 lb. (12) 300 to 10,000 lb. (13) 400 to 14,999 lb. (14) 400 lb. and over. (15) 1000 lb. and over. (16) 1500 lb. and over. (17) 2000 lb. and over. (18) 3500 lb. and over.

([a]) Philadelphia: Galvanized sheets, 25 or more bundles.

Extra for size, quality, etc., apply on above quotations.

*Add 0.271c. for sizes not rolled in Birmingham.

**City of Philadelphia only. Applicable freight rates must be added to basing point prices to obtain delivered price to other localities in metropolitan area.

## LAKE SUPERIOR ORES

*(51.50% Fe, Natural Content, Delivered Lower Lake Ports*)*

| | *Per Gross Ton* |
|---|---|
| Old range, bessemer, 51.50 | $4.75 |
| Old range, non-bessemer, 51.50 | 4.60 |
| Mesaba, bessemer, 51.50 | 4.60 |
| Mesaba, non-bessemer, 51.50 | 4.45 |
| High phosphorus, 51.50 | 4.35 |

*Adjustments are made to indicate prices based on variance of Fe content of ores as analyzed on a dry basis by independent laboratories.

## FLUORSPAR

Maximum price f.o.b. consumer's plant, $30 per short ton plus either (1) rail freight from producer to consumer, or (2) rail freight from Rosiclare, Ill., to consumer, whichever is lower.

***Exception***

When the WPB Steel Division certifies in writing the consumer's need for one of the higher grades of metallurgical fluorspar specified in the table below the price shall be taken from the table plus items (1 and 2) from paragraph above.

| Effective $CaF_2$ Content: | *Base price per short ton* |
|---|---|
| 70% or more | $33.00 |
| 65% but less than 70% | 32.00 |
| 60% but less than 65% | 31.00 |
| Less than 60% | 30.00 |

## SEMI-FINISHED STEEL

***Ingots, Carbon, Rerolling***

Base per gross ton, f.o.b. mill.... $31.00
*Exceptions:* Phoenix Iron Co. may charge $38.75; Kaiser Co., $43.00 f.o.b. Pacific Coast Ports; Empire Sheet & Tinplate Co., $34.25. Pgh. Steel Co. $33.10.

***Ingots, Carbon, Forging***

Base per gross ton, f.o.b. Birmingham, Buffalo, Chicago, Cleveland, Gary, Pittsburgh, Youngstown ..... $36.00
*Exceptions:* Phoenix Iron Co. may charge $43.00; Empire Sheet & Tinplate Co., $39.25, f.o.b. Mansfield, Ohio; West Coast producers, $48.00, f.o.b. Pacific Coast Ports. Pgh. Steel Co. $38.10.

***Ingots, Alloy***

Base per gross ton, f.o.b. Bethlehem, Buffalo, Canton, Coatesville, Chicago, Massillon, Pittsburgh ..... $45.00
*Exceptions:* C/L delivered Detroit add $2.00; delivered East Michigan add $3.00. Connors Steel Co. may charge $45.00 f.o.b. Birmingham.

***Billets, Blooms and Slabs***

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (rerolling only). Prices delivered Detroit are $2.00 higher; delivered E. Michigan, $3 higher; f.o.b. Duluth, billets only, $2.00 higher; billets f.o.b. Pacific ports are $12 higher. Provo, $11.20 higher. Delivered prices do not reflect three per cent tax on freight rates.

| | *Per Gross Ton* |
|---|---|
| Rerolling | $34.00 |
| Forging quality | 40.00 |

For exceptions on semi-finished steel see the footnote on the page of finished steel prices.

***Alloy Billets, Blooms, Slabs***

Pittsburgh, Chicago, Canton, Massillon, Buffalo, or Bethlehem, per gross ton ..... 54.00
Price delivered Detroit $2.00 higher; E. Michigan $3.00 higher.

***Shell Steel***

| | *Per Gross Ton* |
|---|---|
| 3 in. to 12 in. | $52.00 |
| 12 in. to 18 in. | 54.00 |
| 18 in. and over | 56.00 |

Basic open hearth shell steel, f.o.b. Pittsburgh, Chicago, Buffalo, Gary, Cleveland, Youngstown and Birmingham.
Prices delivered Detroit are $2.00 higher; E. Michigan, $3 higher.
Price Exception: Follansbee Steel Corp. permitted to sell at $13.00 per gross ton, f.o.b. Toronto, Ohio, above base price of $52.00.
Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting, or quantity.

***Sheet Bars***

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point.

| | *Per Gross Ton* |
|---|---|
| Open hearth or bessemer | $34.00 |

***Skelp***

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

| | *Per Lb.* |
|---|---|
| Grooved, universal and sheared | 1.90c. |

***Wire Rods***

(*No. 5 to 9/32 in.*)

| | *Per Lb.* |
|---|---|
| Pittsburgh, Chicago, Cleveland | 2.00c. |
| Worcester, Mass. | 2.10c. |
| Birmingham | 2.00c. |
| San Francisco | 2.50c. |
| Galveston | 2.25c. |

9/32 in. to 47/64 in., 0.15c. a lb. higher. Quantity extras apply.

## TOOL STEEL

(*F.o.b. Pittsburgh, Bethlehem, Syracuse*)

| | *Base per lb.* |
|---|---|
| High speed | 67c. |
| Straight molybdenum | 54c. |
| Tungsten-molybdenum | 57½c. |
| High-carbon-chromium | 43c. |
| Oil hardening | 24c. |
| Special carbon | 22c. |
| Extra carbon | 18c. |
| Regular carbon | 14c. |

Warehouse prices east of Mississippi are 2c. a lb. higher; west of Mississippi 3c. higher.

## PRICES

### WELDED PIPE AND TUBING

*Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills*

*(F.o.b. Pittsburgh only on wrought pipe)*
*Base Price—$200.00 per Net Ton*

| | Black | Galv. |
|---|---|---|
| ***Steel (Butt Weld)*** | | |
| ½ in. | 63½ | 51 |
| ¾ in. | 66½ | 55 |
| 1 to 3 in. | 68½ | 57½ |
| ***Wrought Iron (Butt Weld)*** | | |
| ⅛ in. | 24 | 3½ |
| ¼ in. | 30 | 10 |
| ⅜ and ½ in. | 34 | 16 |
| ⅝ in. | 38 | 18½ |
| ¾ in. | 37½ | 18 |
| ***Steel (Lap Weld)*** | | |
| 2 in. | 61 | 49½ |
| 2½ and 3 in. | 64 | 52½ |
| 3½ to 6 in. | 66 | 54½ |
| ***Wrought Iron (Lap Weld)*** | | |
| 2 in. | 30½ | 13 |
| 2½ to 3½ in. | 31½ | 14½ |
| 4 in. | 33½ | 18 |
| 4½ to 8 in. | 32½ | 17 |
| ***Steel (Butt, extra strong, plain ends)*** | | |
| ½ in. | 61½ | 50½ |
| ¾ in. | 65½ | 54½ |
| 1 to 3 in. | 67 | 57 |
| ***Wrought Iron (Same as Above)*** | | |
| ⅛ in. | 25 | 6 |
| ¼ in. | 31 | 12 |
| ⅜ to ½ in. | 38 | 19½ |
| ***Steel (Lap, extra strong, plain ends)*** | | |
| 2 in. | 59 | 48½ |
| 2½ and 3 in. | 63 | 52½ |
| 3½ to 6 in. | 66½ | 56 |
| ***Wrought Iron (Same as Above)*** | | |
| 2 in. | 33½ | 15½ |
| 2½ to 4 in. | 39 | 22½ |
| 4½ to 6 in. | 37½ | 21 |

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher on all butt weld.

### CAST IRON WATER PIPE

| | Per Net Ton |
|---|---|
| 6-in. and larger, del'd Chicago | $54.10 |
| 6-in. and larger, del'd New York | 52.30 |
| 6-in. and larger, Birmingham | 46.00 |
| 6-in. and larger f.o.b. cars, San Francisco or Los Angeles | 69.40 |
| 6-in. and larger f.o.b. cars, Seattle. | 71.20 |

Class "A" and gas pipe, $3 extra; 4-in. pipe is $3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger are $45 at Birmingham and $53.80 delivered Chicago, $59.40 at San Francisco and Los Angeles, and $70.20 at Seattle. Delivered prices do not reflect new 3 per cent tax on freight rates.

### BOILER TUBES

*Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes, Minimum Wall. Net base prices per 100 ft. f.o.b. Pittsburgh, in carload lots.*

| | Seamless Cold Drawn | Hot Rolled | Lap Weld, Hot Rolled |
|---|---|---|---|
| 2 in. o.d. 13 B.W.G. | 15.03 | 13.04 | 12.24 |
| 2½ in. o.d. 12 B.W.G. | 20.21 | 17.54 | 16.58 |
| 3 in. o.d. 12 B.W.G. | 22.48 | 19.50 | 18.25 |
| 3½ in. o.d. 11 B.W.G. | 28.37 | 24.62 | 22.15 |
| 4 in. o.d. 10 B.W.G. | 35.20 | 30.54 | 28.66 |

*(Extras for less carload quantities)*

| | |
|---|---|
| 40,000 lb. or ft., and over | Base |
| 30,000 lb. or ft. to 39,999 lb. or ft. | 5% |
| 20,000 lb. or ft. to 29,999 lb. or ft. | 10% |
| 10,000 lb. or ft. to 19,999 lb. or ft. | 20% |
| 5,000 lb. or ft. to 9,999 lb. or ft. | 30% |
| 2,000 lb. or ft. to 4,999 lb. or ft. | 45% |
| Under 2,000 lb. or ft. | 65% |

## PRICES

### WIRE PRODUCTS

*To the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth*

| | Basing Points Named | Pacific Coast Basing Points† |
|---|---|---|
| | *Base per Keg* | |
| Standard wire nails | $2.55 | $3.05 |
| Coated nails | 2.55 | 3.05 |
| Cut nails, carloads | 3.85 | .... |
| | *Base per 100 Lb.* | |
| Annealed fence wire | $3.05 | $3.55 |
| Annealed galv. fence wire | 3.40 | 3.90 |
| | *Base Column* | |
| Woven wire fence* | $0.67 | $0.85 |
| Fence posts, carloads | .69 | .86 |
| Single loop bale ties | .59 | .84 |
| Galvanized barbed wire** | .70 | .80 |
| Twisted barbless wire | .70 | .... |

*15½ gage and heavier. **On 80-rod spools in carload quantities.
†Prices subject to switching or transportation charges.

### BOLTS, NUTS, RIVETS, SET SCREWS

***Bolts and Nuts***

*(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)*

Machine and Carriage Bolts:

*Base discount less case lots*

| | *Per Cent Off List* |
|---|---|
| ½ in. & smaller x 6 in. & shorter | 65½ |
| 9/16 & ⅝ in. x 6 in. & shorter | 63½ |
| ¾ to 1 in. x 6 in. & shorter | 61 |
| 1⅛ in. and larger, all lengths | 59 |
| All diameters over 6 in. long | 59 |
| Lag, all sizes | 62 |
| Plow bolts | 65 |

Nuts, Cold Punched or Hot Pressed:
*(Hexagon or Square)*

| | |
|---|---|
| ½ in. and smaller | 62 |
| 9/16 to 1 in. inclusive | 59 |
| 1⅛ to 1½ in. inclusive | 57 |
| 1⅝ in. and larger | 56 |

On above bolts and nuts, excepting plow bolts, additional allowance of 10 per cent for full container quantities. There is an additional 5 per cent allowance for carload shipments.

| Semi-Fin. Hexagon Nuts | U.S.S. | S.A.E. |
|---|---|---|
| *Base discount less keg lots* | | |
| 7/16 in. and smaller | .. | 64 |
| ½ in. and smaller | 62 | .. |
| ½ in. through 1 in. | .. | 60 |
| 9/16 in. to 1 in. | 59 | .. |
| 1⅛ in. through 1½ in. | 57 | 58 |
| 1⅝ in. and larger | 56 | .. |

In full keg lots, 10 per cent additional discount.

***Stove Bolts*** — *Consumer*

| | |
|---|---|
| Packages, nuts loose | 71 and 10 |
| In packages, with nuts attached | 71 |
| In bulk | 80 |

On stove bolts freight allowed up to 65c per 100 lb. based on Cleveland, Chicago, New York on lots of 200 lb. or over.

***Large Rivets***
*(½ in. and larger)*

| | *Base per 100 lb.* |
|---|---|
| F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham | $3.75 |

***Small Rivets***
*(7/16 in. and smaller)*

| | *Per Cent Off List* |
|---|---|
| F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham | 65 and 5 |

***Cap and Set Screws*** — *Consumer*

| | *Per Cent Off List* |
|---|---|
| Upset full fin. hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in. | 64 |
| Upset set screws, cup and oval points | 71 |
| Milled studs | 46 |
| Flat head cap screws, listed sizes | 36 |
| Fillister head cap, listed sizes | 51 |

Freight allowed up to 65c per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

### ROOFING TERNE PLATE

*(F.o.b. Pittsburgh, 112 Sheets)*

| | 20x14 in. | 20x28 in. |
|---|---|---|
| 8-lb. coating I.C. | $6.00 | $12.00 |
| 15-lb. coating I.C. | 7.00 | 14.00 |
| 20-lb. coating I.C. | 7.50 | 15.00 |

## PIG IRON

All prices set in bold face type are maxima established by OPA on June 24, 1941. Other domestic prices (in italics) are delivered quotations per gross ton computed on the basis of the official maxima. Delivered prices do not reflect 3 per cent tax on freight rates.

| | No. 2 Foundry | Basic | Bessemer | Malleable | Low Phos-phorus | Charcoal |
|---|---|---|---|---|---|---|
| Boston | *$25.50* | *$25.00* | *$26.50* | *$26.00* | ..... | ..... |
| Brooklyn | *27.50* | *27.00* | ..... | *28.00* | ..... | ..... |
| Jersey City | *26.53* | *26.03* | *27.53* | *27.03* | ..... | ..... |
| Philadelphia (4) | *25.84* | *25.34* | *26.84* | *26.34* | *$30.74* | ..... |
| Bethlehem, Pa. | 25.00 | 24.50 | 26.00 | 25.50 | ..... | ..... |
| Everett, Mass. | 25.00 | 24.50 | 26.00 | 25.50 | ..... | ..... |
| Swedeland, Pa. | 25.00 | 24.50 | 26.00 | 25.50 | ..... | ..... |
| Steelton, Pa. | ..... | 24.50 | ..... | ..... | 29.50 | ..... |
| Birdsboro, Pa. (3) | 25.00 | 24.50 | 26.00 | 25 50 | 29 50 | ..... |
| Sparrows Point, Md. | 25.00 | 24.50 | ..... | ..... | ..... | ..... |
| Erie, Pa. | 24.00 | 23.50 | 25.00 | 24.50 | ..... | ..... |
| Neville Island, Pa. | 24.00 | 23.50 | 24.50 | 24.00 | ..... | ..... |
| Sharpsville, Pa. (1) | 24.00 | 23.50 | 24.50 | 24.00 | ..... | ..... |
| Buffalo | 24.00 | 23.00 | 25.00 | 24.50 | 29.50 | ..... |
| Cincinnati, Ohio | *25.11* | *24.61* | ..... | *25.11* | ..... | ..... |
| Canton, Ohio | *25.39* | *24.89* | *25.89* | *25.39* | *32.69* | ..... |
| Mansfield, Ohio | *25.94* | *25.44* | *26.44* | *25.94* | *32.86* | ..... |
| St. Louis | *24.50* | *24.50* | ..... | ..... | ..... | ..... |
| Chicago | 24.00 | 23.50 | 24.50 | 24.00 | *35.46* | *$37.34* |
| Granite City, Ill. | 24.00 | 23.50 | 24.50 | 24.00 | ..... | ..... |
| Cleveland | 24.00 | 23.50 | 24.50 | 24.00 | *32.42* | ..... |
| Hamilton, Ohio | 24.00 | 23.50 | ..... | 24.00 | ..... | ..... |
| Toledo | 24.00 | 23.50 | 24.50 | 24.00 | ..... | ..... |
| Youngstown | 24.00 | 23.50 | 24.50 | 24.00 | *32.42* | ..... |
| Ostrolt | 24.00 | 23.50 | 24.50 | 24.00 | ..... | ..... |
| Lake Superior fc. | ..... | ..... | ..... | ..... | ..... | 34.00 |
| Lyles, Tenn. fc. (2) | ..... | ..... | ..... | ..... | ..... | 33.00 |
| St. Paul | *26.63* | 26.13 | *27.13* | *26.63* | *39.80* | ..... |
| Duluth | 24.50 | 24.00 | 25.00 | 24.50 | ..... | ..... |
| Birmingham | 20.38 | 19.00 | 25.00 | ..... | ..... | ..... |
| Los Angeles | *26.95* | ..... | ..... | ..... | ..... | ..... |
| San Francisco | *26.95* | ..... | ..... | ..... | ..... | ..... |
| Seattle | *26.95* | ..... | ..... | ..... | ..... | ..... |
| Provo, Utah | 22.00 | 21.50 | ..... | ..... | ..... | ..... |
| Montreal | *27.50* | *27.50* | ..... | *28.00* | ..... | ..... |
| Toronto | *25.50* | *25.50* | ..... | *26.00* | ..... | ..... |

GRAY FORGE IRON Valley or Pittsburgh furnace $23.50

(1) Pittsburgh Coke & Iron Co. (Sharpsville, Pa., furnace only) and the Struthers Iron and Steel Co., Struthers, Ohio, may charge 50c. a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable. Struthers Iron and Steel Co. may add another $1.00 per gross ton for iron from Struthers, Ohio, plant.

(2) Price shown is for low-phosphorous iron; high phosphorous sells for $28.50 at the furnace.

(3) E. & G. Brooke Co. Birdsboro, Pa., permitted to charge $1.00 per ton extra.

(4) Pittsburgh Ferromanganese Co. (Chester furnace only) may charge $2.25 a ton over maximum basing point prices.

Basing point prices are subject to switching charges; Silicon differentials (not to exceed 50c. a ton for each 0.25 per cent silicon content in excess of base grade which is 1.75 to 2.25 per cent); Phosphorus differentials, a reduction of 38c. per ton for phosphorus content of 0.70 per cent and over; Manganese differentials, a charge not to exceed 50c. per ton for each 0.50 per cent manganese content in excess of 1.00 per cent. Effective March 3, 1943, $2 per ton extra may be charged for 0.5 to 0.75 per cent nickel content and $1 per ton extra for each additional 0.25 per cent nickel.

## METAL POWDERS

Prices are based on current market prices of ingots plus a fixed figure. F.o.b. shipping point, c. per lb., ton lots.

| | |
|---|---|
| Copper, electrolytic, 150 and 200 mesh | 21⅛ to 23⅛c |
| Copper, reduced, 150 and 200 mesh | 20½ to 25½c |
| Iron, commercial, 100 and 200 mesh, 96 + % Fe | 13½ to 15c. |
| Iron, crushed, 200 mesh and finer, 90 + % Fe | 4c. |
| Iron, hydrogen reduced, 300 mesh and finer, 98½ + % Fe | 63c |
| Iron, electrolytic, unannealed, 300 mesh and coarser, 99 + % Fe | 30 to 33c |
| Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe | 42c |
| Iron, carbonyl, 300 mesh and finer, 98-99.8 + % Fe | 90c. |
| Aluminum, 100 and 200 mesh | *23 to 27c. |
| Antimony, 100 mesh | 20.6c. |
| Cadmium, 100 mesh | $1 |
| Chromium, 150 mesh | $1.03 |
| Lead, 100, 200 & 300 mesh, | 11½ to 12½c. |
| Manganese, 150 mesh | 51c. |
| Nickel, 150 mesh | 51½c. |
| Solder powder, 100 mesh, 8½c. plus metal | |
| Tin, 100 mesh | 58¾c. |
| Tungsten metal powder, 98%-99%, any quantity, per lb. | $2.60 |
| Molybdenum power, 99%, in 200-lb. kegs, f.o.b. York, Pa., per lb. | $2.60 |
| Under 100 lb. | $3.00 |

*Freight allowed east of Mississippi.

## COKE

| | Net Ton |
|---|---|
| **Furnace, beehive (f.o.b. oven)** | |
| Connellsville, Pa. | $7.00* |
| **Foundry, beehive (f.o.b. oven)** | |
| Fayette Co., W. Va. | 8.10 |
| Connellsville, Pa. | 8.25 |
| **Foundry, By-Product** | |
| Chicago, del'd | 13.35 |
| Chicago, f.o.b. | 12.60 |
| New England, del'd | 14.25 |
| Kearny, N. J., f.o.b. | 12.65 |
| Philadelphia, del'd | 12.88 |
| Buffalo, del'd | 13.00 |
| Portsmouth, Ohio, f.o.b. | 11.10 |
| Painesville, Ohio, f.o.b. | 11.75 |
| Erie, del'd | 12.75 |
| Cleveland, del'd | 12.80 |
| Cincinnati, del'd | 12.85 |
| St. Louis, del'd | 13.85 |
| Birmingham, del'd | 10.50 |

*Hand drawn ovens using trucked coal permitted to charge $7.75 per ton plus transportation charges. **Mo., Ala., and Tenn. producers—$13.35.

## PRICES

### REFRACTORIES
*(F.o.b. Works)*

| | Per 1000 |
|---|---|
| ***Fire Clay Brick*** | |
| Super-duty brick, St. Louis | $64.60 |
| First quality, Pa., Md., Ky., Mo., Ill. | 51.30 |
| First quality, New Jersey | 56.00 |
| Sec. quality, Pa., Md., Ky., Mo., Ill. | 46.55 |
| Second quality, New Jersey | 51.00 |
| No. 1, Ohio | 43.00 |
| Ground fire clay, net ton | 7.60 |
| ***Silica Brick*** | |
| Pennsylvania and Birmingham | $51.30 |
| Chicago District | 58.90 |
| Silica cement, net ton (Eastern) | 9.00 |
| | *Per Net Ton* |
| ***Chrome Brick*** | |
| Standard chemically bonded, Balt., Plymouth Meeting, Chester | $54.00 |
| ***Magnesite Brick*** | |
| Standard, Balt. and Chester | $76.00 |
| Chemically bonded, Baltimore | 65.00 |
| ***Grain Magnesite*** | |
| Domestic, f.o.b. Balt. and Chester in sacks (carloads) | $43.48 |
| Domestic, f.o.b. Chewelah, Wash. (in bulk) | 22.00 |

### RAILS, TRACK SUPPLIES
*(F.o.b. Mill)*

| | |
|---|---|
| Standard rails, heavier than 60 lb., No. 1 O.H., gross ton | $40.00 |
| Angle splice bars, 100 lb. | 2.70 |
| *(F.o.b. Basing Points)* | *Per Gross Ton* |
| Light rails (from billets) | $40.00 |
| Light rails (from rail steel) | 39.00 |
| | *Base per Lb.* |
| Cut spikes | 3.00c. |
| Screw spikes | 5.15c. |
| Tie plates, steel | 2.15c. |
| Tie plates, Pacific Coast | 2.30c. |
| Track bolts | 4.75c. |
| Track bolts, heat treated, to railroads | 5.00c. |
| Track bolts, jobbers discount | 63-5 |

Basing points, light rails, Pittsburgh, Chicago, Birmingham; cut spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo. Cut spikes alone—Youngstown, Lebanon, Pa., Richmond, Oregon and Washington ports, add 25c.

### CORROSION AND HEAT-RESISTING STEEL
*(Per lb. base price, f.o.b. Pittsburgh)*

***Chromium-Nickel Alloys***

| | No. 304 | No. 302 |
|---|---|---|
| Forging billets | 21.25c. | 20.40c. |
| Bars | 25.00c. | 24.00c. |
| Plates | 29.00c. | 27.00c. |
| Structural shapes | 25.00c. | 24.00c. |
| Sheets | 36.00c. | 34.00c. |
| Hot rolled strip | 23.50c. | 21.50c. |
| Cold rolled strip | 30.00c. | 28.00c. |
| Drawn wire | 25.00c. | 24.00c. |

***Straight-Chromium Alloys***

| | No. 410 | No. 430 | No. 442 | No. 446 |
|---|---|---|---|---|
| F.Billets | 15.725c. | 16.15c. | 19.125c. | 23.375c. |
| Bars | 18.50c. | 19.00c. | 22.50c. | 27.50c. |
| Plates | 21.50c. | 22.00c. | 25.50c. | 30.50c. |
| Sheets | 26.50c. | 29.00c. | 32.50c. | 36.50c. |
| Hot strip | 17.00c. | 17.50c. | 24.00c. | 35.00c. |
| Cold strip | 22.00c. | 22.50c. | 32.00c. | 52.00c. |

***Chromium-Nickel Clad Steel (20%)***

| | No. 304 |
|---|---|
| Plates | 18.00c.* |
| Sheets | 19.00c. |

*Includes annealing and pickling.

### ELECTRICAL SHEETS
*(Base, f.o.b. Pittsburgh)*

| | Per Lb. |
|---|---|
| Field grade | 3.20c. |
| Armature | 3.55c. |
| Electrical | 4.05c. |
| Motor | 4.95c. |
| Dynamo | 5.65c. |
| Transformer 72 | 6.15c. |
| Transformer 65 | 7.15c. |
| Transformer 58 | 7.65c. |
| Transformer 52 | 8.45c. |

F.o.b. Granite City, add 10c. per 100 lb. on field grade to and including dynamo. Pacific ports add 75c. per 100 lb. on all grades.

## PRICES

***Ferromanganese***

78-82% Mn, maximum contract base price per gross ton, lump size, f.o.b. car at Baltimore, Bethlehem, Philadelphia, New York, Birmingham, Rockdale, Rockwood, Tenn.

| | |
|---|---|
| Carload lots (bulk) | $135.00 |
| Carload lots (packed) | 141.00 |
| Less ton lots (packed) | 148.50 |

Premium, $1.70 for each 1% above 82% Mn; penalty, $1.70 for each 1% below 78%.

***Manganese Metal***

Contract basis, lump size, per lb. of metal, f.o.b. shipping point with freight allowed. Spot sales add 2c. per lb.

96-98% Mn, .2% max. C, 1% max. Si, 2% max. Fe.

| | |
|---|---|
| Carload, bulk | 36c. |
| L.c.l. lots | 38c. |

95-97% Mn, .2% max. C, 1.5% max. Si, 2.5% max. Fe.

| | |
|---|---|
| Carload, bulk | 34c. |
| L.c.l. lots | 35c. |

***Spiegeleisen***

Maximum base, contract prices, per gross ton, lump, f.o.b. Palmerton, Pa.

| | 16-19% Mn 3% max. Si | 19-21% Mn 3% max. Si |
|---|---|---|
| Carloads | $35.00 | $36.00 |
| Less ton | 47.50 | 48.50 |

***Electric Ferrosilicon***

OPA maximum base price cents per lb. contained Si, lump size in carlots, f.o.b. shipping point with freight allowed to destination.

| | Eastern Zone | Central Zone | Western Zone |
|---|---|---|---|
| 50% Si | 6.65c. | 7.10c. | 7.25c. |
| 75% Si | 8.05c. | 8.20c. | 8.75c. |
| 80-90% Si | 8.90c. | 9.05c. | 9.55c. |
| 90-95% Si | 11.05c. | 11.20c. | 11.65c. |

Spot sales add: .45c. per lb. for 50% Si, .3c. per lb. or 75% Si .25c. per lb. for 80-90% and 90-95% Si.

***Silvery Iron***

*(Per Gross Ton, base 6.00 to 6.50 Si)*

| | |
|---|---|
| F.o.b. Jackson, Ohio | $29.50* |
| Buffalo | 30.75* |

For each additional 0.50% silicon add $1 a ton. For each 0.50% manganese over 1% add 50c. a ton. Add $1 a ton for 0.75% phosphoros or over.

*OPA price established 6-24-41.

***Bessemer Ferrosilicon***

Prices are $1 a ton above silvery iron quotations of comparable analysis.

***Silicon Metal***

OPA maximum base price per lb. of contained Si, lump size, f.o.b. shipping point with freight allowed to destination, for l.c.l. above 2000 lb., packed. Add .25c. for spot sales.

| | Eastern Zone | Central Zone | Western Zone |
|---|---|---|---|
| 96% Si, 2% Fe. | 13.10c. | 13.55c. | 16.50c. |
| 97% Si, 1% Fe. | 13.45c. | 13.90c. | 16.80c. |

***Ferrosilicon Briquets***

OPA maximum base price per lb. of briquet, bulk, f.o.b. shipping point with freight allowed to destination. Approximately 40% Si. Add .25c. for spot sales.

| | Eastern Zone | Central Zone | Western Zone |
|---|---|---|---|
| Carload, bulk | 3.35c. | 3.50c. | 3.65c. |
| 2000 lb.-carload | 3.8c. | 4.2c. | 4.35c. |

***Silicomanganese***

Contract basis lump size, per lb. of metal, f.o.b. shipping point with freight allowed. Add .25c. for spot sales. 65-70% Mn, 17-20% Si, 1.5% max. C.

| | |
|---|---|
| Carload, bulk | 6.05c. |
| 2000 lb. to carload | 6.70c. |
| Under 2000 lb. | 6.90c. |
| Briquets, contract, basis carlots, bulk freight allowed, per lb. | 5.80c. |
| 2000 lb. to carload | 6.30c. |
| Less ton lots | 6.55c. |

***Ferrochrome***

*(65-72% Cr, 2% max. Si)*

OPA maximum base contract prices per lb. of contained Cr, lump size in carload lots, f.o.b. shipping point, freight allowed to destination. Add .25c. per lb. contained Cr for spot sales.

| | Eastern Zone | Central Zone | Western Zone |
|---|---|---|---|
| 0.06% C | 23.00c. | 23.40c. | 24.00c. |
| 0.10% C | 22.50c. | 22.90c. | 23.50c. |
| 0.15% C | 22.00c. | 22.40c. | 23.00c. |
| 0.20% C | 21.50c. | 21.90c. | 22.50c. |
| 0.50% C | 21.00c. | 21.40c. | 22.00c. |
| 1.00% C | 20.50c. | 20.90c. | 21.50c. |
| 2.00% C | 19.50c. | 19.90c. | 21.00c. |
| 66-71% Cr, 4-10% C | 13.00c. | 13.40c. | 14.00c. |

## PRICES

***Other Ferroalloys***

Ferrotungsten, Standard grade, lump or ¼X down, packed, f.o.b. plant at Niagara Falls, New York, Washington, Pa., York, Pa., per lb. contained tungsten, 10,000 lb. or more... $1.90

Ferrovanadium, 35-55%, contract basis, f.o.b. producer's plant, usual freight allowances, per usual freight allowances, per lb. contained Va.
- Open Hearth ..... $2.70
- Crucible ..... $2.80
- Primos ..... $2.90

Cobalt, 97% min., keg packed, contract basis, f.o.b. producer's plant, usual freight allowances, per lb. of cobalt metal ..... $1.50

Vanadium pentoxide, 88%-92% $V_2O_5$ technical grade, contract basis, any quantity, per lb. contained $V_2O_5$. Spot sales add 5c. per lb. contained $V_2O_5$ ..... $1.10

Ferroboron, contract basis, 17.50% min. Bo, f.o.b. producer's plant with usual freight allowances, per lb. of alloy.
- 2000 lb. to carload ..... $1.20
- Under 2000 lb. ..... 1.30

Silcaz No. 3, contract basis, f.o.b. producer's plant with usual freight allowances, per lb. of alloy. (Pending OPA approval)
- Carload lots ..... 25c.
- 2000 lb. to carload ..... 26c.

Silvaz No. 3, contract basis, f.o.b. producer's plant with freight allowances, per lb. of alloy (Pending OPA approval)
- Carload lots ..... 58c.
- 2000 lb. to carload ..... 59c.

Grainal, f.o.b. Bridgeville, Pa., freight allowed 50 lb. and over, max. based on rate to St. Louis
- No. 1 ..... 87.5c.
- No. 6 ..... 60c.
- No. 79 ..... 45c.

Bertram, f.o.b. Niagara Falls
- Ton lots, per lb. ..... 45c.
- Less ton lots, per lb. ..... 50c.

Ferrocolumbium, 50-60%, contract basis, f.o.b. plant with freight allowances, per lb. contained Cb.
- 2000 lb. lots ..... $2.25
- Under 2000 lb. lots ..... $2.30

Ferrotitanium, 40%-45%, f.o.b. 0.10c. max. Niagara Falls, N. Y., ton lots, per lb. contained Ti.. $1.23
- Less ton lots ..... $1.25

Ferrotitanium, 20%-25%, 0.10 C max., ton lots, per lb. contained titanium ..... $1.35
- Less ton lots ..... $1.40

High-carbon ferrotitanium, 15%-20%, 6%-8% carbon, contract basis, f.o.b. Niagara Falls, N. Y., freight allowed East of Mississippi River, North of Baltimore and St. Louis, per carload ..... $142.50

Ferrophosphorus, 18% electric or blast furnaces, f.o.b. Anniston, Ala., carlots, with $3 unitage freight equaled with Rockdale, Tenn., per gross ton ..... $58.50

Ferrophosphorus, electrolytic 23-26%, carlets, f.o.b. Monsanto (Siglo), Tenn., $3 unitage freight equalized with Nashville, per gross ton ..... $75.00

Ferromolybdenum, 55-75%, f.o.b. Langeloth, Washington, Pa., any quantity, per lb. contained Mo. 95c.

Calcium molybdate, 40%-45%, f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained Mo ..... 80c.

Molybdenum oxide briquetes, 48%-52% Mo, f.o.b. Yangeloth, Pa., per lb. contained Mo ..... 80c.

Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per lb. contained Mo ..... 80c.

Zirconium, 35-40%, contract basis, f.o.b. producer's plant with freight allowances, per lb. of alloy. Add ¼c. for spot sales
- Carload lots ..... 14c.

Zirconium, 12-15%, contract basis, lump, f.o.b. plant usual freight allowances, per lb. of alloy
- Carload, bulk ..... 4.6c.

Alsifer (approx. 20% Al, 40% Si and 40% Fe), contract basis, f.o.b. Niagara Falls, carload, bulk ..... 5.75c.
- Ton lots ..... 7.25c.

Simanal (approx. 20% Si, 20% Mn, 20% Al), contract basis, f.o.b. Philo, Ohio, with freight not to exceed St. Louis rate allowed, per lb.
- Car lots ..... 8.75c.
- Ton lots ..... 9.25c.

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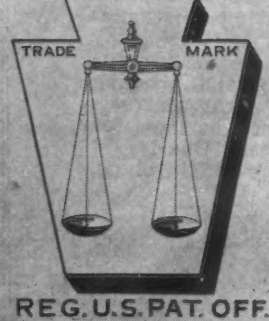


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